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NRC Safety Significance Assessment Team Report on allegations related to the South Texas Project, Units 1 and 2

Docket Nos. 50-498 and 50-499

Houston Lighting and Power Company

U.S. Nuclear Regulatory Commission
Office of Nuclear Reactor Regulation

March 1988

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ABSTRACT

This report provides the results of a review by the Safety Significance Assessment Team (SSAT) of the Nuclear Regulatory Commission (NRC) of alleged construction irregularities at Houston Lighting and Power Company's South Texas Project (STP), Units 1 and 2 (Docket Nos. 50-498, 50-499), located in Matagorda County, Texas. These allegations were provided to the NRC by the Government Accountability Project (GAP) which received them from approximately 35 current and former employees of STP, and covered a wide range of concerns about hardware and quality assurance and control, and issues of management, harassment/intimidation, and wrongdoing. Only those concerns that the SSAT, considered to be technically oriented were selected for review on the basis of their possible safety significance; generic implications; specificity to a particular plant component, system or structure; and to provide a multidiscipline overview of the implementation and effectiveness of the STP Quality Assurance Program.

The SSAT review of GAP's allegations has identified no substantive safety issue that would warrant delay in the NRC's consideration of a full-power license for STP Unit 1.

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EXECUTIVE SUMMARY

After approximately one year of repeated requests to obtain information from the Government Accountability Project (GAP) concerning alleged construction deficiencies at Houston Lighting and Power Company's South Texas Project (STP) facility, an agreement was reached between the NRC Executive Director for Operations (EDO) and GAP that would permit the NRC staff to review GAP's allegations.

The NRC staff performed an initial assessment of allegation summaries provided by GAP and found that it could not reach a conclusion about the safety significance of the allegations because the information was not specific enough. In order to obtain more detailed information, an NRC team was assembled, referred to hereafter as the SSAT (Safety Significance Assessment Team), to review GAP records of the interviews with the allegers and individual allegations that GAP extracted from the interviews. Generally, the SSAT's initial screening of GAP records determined that a large majority of the allegations were not specific in identifying a particular component, system, or location about which the alleger had expressed concern.

The SSAT review of GAP's files identified approximately 700 allegations. As the review continued, the SSAT determined that 120 of the 700 allegations were repetitious, 240 were considered as either harassment/intimidation or as wrongdoing, and 140 more were not safety-related. Of the original 700, a total of 213 allegations remained as possible candidates for onsite inspection at STP. Examples of these allegations are: pipe joints not properly installed; steam generator out of plumb; 20% of valves installed backward; heating, ventilation, and air conditioning (HVAC) ductwork and supports not installed per specifications; fasteners from questionable U.S. and foreign countries used in plant; Raychem cable splices do not meet safety standards; faulty weld rod used throughout the plant; coatings on orbital bridge flaking and chipping; crack in basemat of fuel handling building; and as-built items do not agree with as-designed configurations.

The SSAT reviewed all 213 allegations in detail and subsequently placed allegations in categories on the basis of the discipline, equipment, and shared characteristics (e.g., mechanical/valves/installation; electrical/splices/Raychem). From these categories of allegations, the SSAT identified for onsite inspection those allegations that were judged to have the highest safety significance. Ten such allegations were identified and designated as primary allegations. In addition, 61 secondary allegations were selected that conveyed concerns similar to those of the primary allegations. The 71 allegations selected for onsite inspection are representative of the technical concerns conveyed by the allegers represented by GAP and bound the 213 allegations either specifically or on a generic basis.

The selected allegations encompassed the following areas: piping and mechanical components; valves; heating, ventilation, and air conditioning (HVAC); fasteners; welding; electrical cable and instrumentation; civil and structural; coatings; quality assurance and control; and polar crane and orbital bridge.

In view of the lack of specific details, the SSAT developed a program for inspecting the allegations that included provisions to compensate for the general nature of the allegations. An essential part of the SSAT program was the development of detailed inspection plans that included all the steps necessary to thoroughly inspect the installed condition at STP and provide a broad and generic look that would bound the generalized concerns conveyed by the allegations.

Because of the general lack of specificity and detail in GAP's allegation files, the SSAT made arrangements with GAP to interview the allegers so specific information could be obtained for those allegations that had been selected for inspection. GAP identified 19 allegers involved with the selected allegations; however, only 10 of these 19 allegers could be reached and subsequently they were interviewed by the SSAT; according to GAP, these 10 allegers were people who had the most significant concerns. The interviews were conducted before and during the onsite inspection at the STP facility. With only a few exceptions, the additional information provided by the allegers continued to be deficient on specific details.

The SSAT conducted the onsite inspection during the week of January 18-22, 1988. During the site inspection, the SSAT inspected those areas related to the selected 71 allegations and focused its efforts on the safety significance of the technical concerns in those areas. The SSAT onsite inspection has identified no substantive concern. The SSAT found that several of the allegations selected for inspection at the STP facility were substantiated at some point in the construction history between 1983 and 1986. However, the SSAT found that except for a very few isolated instances, STP's Quality Assurance Program was successful in identifying the concerns and applying appropriate corrective actions.

As a result of the broad, generic, and programmatic look given to the areas of concerns by SSAT to compensate for the lack of specificity conveyed by the allegations, the SSAT inspected many other hardware and QA/QC-related characteristics at the STP facility. Also, the SSAT used NRC Region IV inspection reports and Houston Lighting and Power Company's SAFETEAM investigation reports that were determined to offer additional insight on the allegations being reviewed by the SSAT.

Considering the satisfactory inspection findings concerning the selected allegations, the SSAT determined that many of the remaining allegations which were not inspected could be closed out. Of the 213 allegations identified as possible candidates for inspection, 71 were inspected at the site and 119 were closed out because they were found to be duplicates of the allegations selected for inspection, or related allegations that were already being covered by the SSAT inspection. Of the 23 remaining allegations, 4 were found to be duplicated. The remaining 19 lacked specificity to determine whether they can be enveloped by the inspection performed by SSAT. However, the SSAT determined that the subject matter conveyed by the remaining 19 allegations involved the implementation of QA criteria which have been evaluated by SSAT as part of its overall review of the effectiveness of the STP Quality Assurance Program and found to be acceptable. The SSAT, therefore, concludes that these remaining 19 allegations could not be of immediate safety significance, and are considered closed until such time that specific information will justify further NRC review.

In conclusion, the SSAT review of all the GAP allegations has identified no substantive safety issue that would warrant delay in the NRC's consideration of a full-power license for STP, Unit 1.

However, it should be noted that the NRC Office of Investigations has not completed its investigation of GAP's allegations concerning harassment/intimidation and wrongdoing. Upon the completion of those efforts, any technical concern spun from the investigations will be further reviewed by NRC technical staff for safety significance.

1 INTRODUCTION AND BACKGROUND

In January 1987, the Government Accountability Project (GAP) informed the U.S. Nuclear Regulatory Commission (NRC) that it had begun investigating allegations concerning the safety of the South Texas Project (STP). GAP received reports from approximately 35 current and former employees of STP alleging irregularities in the construction of the plant. GAP informed the NRC that a public report would be issued when the investigation was complete. GAP advised the NRC that unless it was willing to establish an independent team to process the allegations, GAP would turn the allegations over to the State Attorney General's Office, congressional committees, and other regulatory and municipal bodies for processing.

Correspondence followed between the NRC Executive Director for Operations (EDO) and GAP regarding management of the allegations. After repeated requests for the information, the EDO issued a subpoena requesting GAP's attorney, Billie P. Garde, to testify and produce documents regarding the STP allegations. On May 22, 1987, attorneys for GAP and the NRC entered into an agreement. GAP agreed to move to quash the subpoena by May 29, 1987, arguing that compliance with the subpoena would compromise the public health and safety, the EDO has no authority to issue the subpoena, and the attorney-client privilege and work product doctrine precluded divulging the information requested.

The NRC agreed to continue the appearance date for the subpoena from May 26, 1987, until 14 days after the decision on the motion to quash, unless the parties agreed on an earlier date. The NRC disagreed with GAP's reasoning to quash the subpoena, arguing that the failure of the NRC to obtain the allegations would more likely compromise the public health and safety, particularly if the allegations were substantiated.

The U.S. District Court ruled on October 27, 1987 to deny enforcement of the NRC's subpoena because of the possibility of "abridgement of constitutionally protected associational rights." In addition, the court stated that, "Alternatives minimizing the intrusion on associational rights must be carefully and conscientiously explored before resort may be had to the court's process." Subsequently, an agreement was reached between the EDO and GAP on the main elements of a process that would provide the NRC staff limited access to information that might be of relevance in the forthcoming licensing decisions regarding STP. On November 19, 1987, NRC staff and GAP representatives met in the EDO offices in Bethesda, Maryland. The NRC technical staff reviewers present were permitted to see brief summaries of the allegations in the possession of GAP. During the meeting, the NRC technical staff attempted to assess the safety significance of the allegations. However, the information made available to the technical staff lacked specificity and the staff could not reach conclusions on safety significance. In order for the NRC technical staff to gain access to more detailed information, arrangements were made for the NRC technical staff to review records pertaining to the allegations at GAP's offices in Washington, D.C. The NRC and GAP agreed that the protocol for the NRC staff's work at GAP's offices was to protect, to GAP's satisfaction, the identity of the allegers.

2 REVIEW APPROACH AND METHODOLOGY

2.1 Government Accountability Project's Allegation Files

An NRC team was assembled, referred to hereafter as the SSAT (Safety Significance Assessment Team) to review GAP records of the interviews with the allegers (referred to by GAP as "concerned individuals," CI) and individual allegations that GAP extracted from the interviews.*

In December 1987, the SSAT completed its review of the information made available by GAP. GAP presented audio tapes of some of the interviews conducted by a GAP consultant with the allegers, the consultant's hand-written text extrapolated from the interview tapes together with supporting information, and a compilation of allegation data, which included a brief description of each concern.

GAP's initial categorization of the allegations listed duplicate concerns under different review disciplines. Because of this, the SSAT initially had to consider approximately 700 allegations. When duplications were reconciled, approximately 580 individual allegations remained. Of these 580, approximately 160 allegations were variations of the initial allegation and merely restated some additional facets of the original allegation, such as possible documentation problems, inspection concerns, or intimidation and harassment related to or caused by the initial allegation. GAP categorized the allegations into four sections: safety-related, intimidation and harassment, wrongdoing, and non-safety-related; 26 discipline subsets and 4 sub-discipline categories were also designated. Table 2.1 presents the categorization and designation of allegations as used by GAP.

The GAP consultant's handwritten text was assembled in numbered files that contained reference materials related to the allegations. There were approximately 30 files that contained varying quantities of text and reference data and 2 separate files that contained approximately 580 individual allegation data sheets. Moreover, GAP revealed the existence of allegation files from NRC employees concerning the STP facility. However, these files were not made available to the SSAT for review. Also, according to GAP, there were other files concerning STP allegations that GAP withheld from the SSAT at the request of the allegers involved. As agreed, at the completion of the review, all of the records examined by the SSAT remained at GAP's headquarters, and the SSAT protected the identity of the allegers represented by GAP.

2.2 Screening and Categorization of Allegations

The initial screening was performed by SSAT members who have comprehensive knowledge in particular areas related to the alleged concerns: mechanical,

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*Members of the SSAT, other staff, and consultants who aided this review effort are listed in Appendix A.

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Table 2.1 GAP Categorization of Allegations

Section*	Discipline	Category	Allegation	Related allegations
I Safety-related	A - Piping/mechanical/instrumentation	a. Hardware	0001-9999**	.1
	B - Electrical			.2
II Intimidation/ harrassment	C - Civil/structural	b. Documentation/ drawings		.3
	D - Heating, ventilation, and air conditioning			etc.
III Wrongdoing	E - Engineering/design	c. Inspection/ testing		
	F - Procurement/purchasing			
IV Non-safety-related	G - Equipment qualification			
	H - Fire protection	d. Other		
	I - Quality assurance/quality control/ N-5/systems completion			
	J - Welding			
	K - Safety/security			
	L - Health physics			
	M - Seismic & environmental		EXAMPLES:	
	N - Generic (all disciplines)			
	O - Personnel		IAa-0001 = Safety-related/ piping/hardware-specific allegation number	
	P - Management			
	Q - Training			
	R - NRC			
	S - SAFETEAM			
	T - Ebasco		IAb-0001.1 = Safety-related/ piping/hardware-specific allegation number, subset documentation	
	U - HL&P			
	V - System complete & turnover			
	W - Authorized nuclear inspection			
	X - Qualification of personnel			
	Y - Bechtel			
	Z - Document control			

*NRC used arabic numerals for section.

**Allegations numbers are cross-referenced to actual GAP allegation number.

electrical, instrumentation, civil, structural, and metallurgical engineering; quality assurance and control; nuclear plant construction and operations; and the NRC inspection program. The technical experts were supplemented by other staff members experienced in project management and engineering to extract the safety-related concerns from the harassment and intimidation, wrongdoing, and management issues.

SSAT members reviewed each allegation, its associated interview text, and the reference material filed in their own areas of expertise. Screening also included listening to alleger interview audio tapes to verify the accuracy of the written text that GAP's consultant had produced from the tapes.

Generally, the SSAT's initial screening determined that a large majority of the allegations were not specific in identifying a particular component, system, or location about which the alleger was concerned. To ensure that all aspects of allegations identified by GAP were reviewed and evaluated, the SSAT forwarded to NRC's Office of Investigations (OI) all allegations that they reviewed which were categorized as harassment/intimidation or wrongdoing.

2.3 Compilation of Allegation Data

The results of the SSAT review and initial screening were documented and identified by GAP allegation number. The SSAT examination of the concerns conveyed by the allegations showed that common characteristics permitted grouping and prioritization. The grouping process would enable the SSAT to use its resources efficiently to conduct physical inspections; the priorization process would enable assessments of wider implications, such as determining root causes and generic implications, as well as probing for evidence of a quality assurance breakdown. Therefore, the SSAT grouped the concerns conveyed by the allegations according to shared characteristics. The information generated by SSAT's review and initial screening was entered into a computerized data base and each GAP allegation was assigned to one of the following categories: mechanical and piping, electrical, civil/structural, quality assurance/quality control (QA/QC), harassment/intimidation, wrongdoing, NRC, and management issues. Each category had several subsets that were used to specify more closely issues that each allegation appeared to be addressing. Table 2.2 presents SSAT allegation groups and subgroups.

As agreed, the distribution of SSAT's computerized data files printout of GAP's allegations was limited to the members of SSAT, except for those allegations concerning harassment/intimidation and wrongdoing, which were referred to the NRC's Office of Investigations. This was done to protect from disclosure the identity of the allegers when the subject matter of some of the allegations could have been used to identify the alleger. Accordingly, the SSAT has not included an actual list of GAP's allegations in this report and instead it has briefly characterized the allegations.

2.4 Selection of Allegations for Site Inspection

From approximately 700 original allegations found in GAP's files, the SSAT deleted duplicate allegations and those considered to be non-safety-related, harassment/intimidation, and wrongdoing. As indicated from the results of this sort (see material that follows), the SSAT determined that of the original 700 allegations, only about 200 remained as possible candidates for onsite inspection at STP.

Table 2.2 SSAT Categorization of Allegations

Group	Subgroup	Sub-subgroup
A. Mechanical & piping	1. Piping	a. Pipe
		b. Hydro
		c. Configuration
		d. Chloride contamination
	2. Valves	a. Limitorque
		b. Installation
		c. Missing
	3. Materials	a. Traceability
		b. Compatibility
	4. HVAC	a. Procurement
		b. Installation
		c. Fabrication
		d. Testing
	5. Seismic qualification	
	6. Fasteners	a. Counterfeit/foreign
	7. Welding	a. Weld rod
		b. Qualifications
		c. Welder ID
		d. Traceability
	0. Other	
B. Electrical	1. Splices	a. Raychem
	2. Cable and conduit	
	3. Instrumentation	
	4. Environmental qualification	
	0. Other	
C. Civil/structural	1. Concrete	
	2. Soils	
	3. Coatings	
	0. Other	

Table 2.2 (Continued)

Group	Subgroup	Sub-subgroup
D. QA/QC	1. Design control	
	2. Procurement	
	3. Document control	
	4. QC inspection	a. Inspection records
		b. Travelers
		c. Hold point
		d. Authorized nuclear inspector
		e. Nonconformance reports
	5. As-built vs. design	
	6. System turnover	
	7. FSAR/specifications	
	8. Procedures	
	0. Other	
E. Harassment/intimidation*		
F. Wrongdoing*		
G. NRC		
H. Management	1. HL&P	
	2. Bechtel	
	3. Ebasco	
	4. Intermech	
	5. Personnel practices	
	6. Training	
	7. SAFETEAM	
	0. Other	
0. Other		

*Safety-related issues only.

The SSAT classified approximately 240 of GAP's original allegations as either harassment/intimidation or as wrongdoing, and the SSAT referred these to NRC's Office of Investigations for OI review.

Approximately 140 of the original allegations were not found to be of significant safety concern. These were generally allegations related to the cost of the construction effort, industrial safety, personnel practices, or management activities. These non-safety-related allegations are considered closed and no need is seen for further review.

• GAP's original allegations	~700	
• Repeated allegation identification numbers	~120	(leaving ~580)
• Harassment/intimidation and wrongdoing allegations identified by GAP and SSAT	~240	(leaving ~340)
• Non-safety-related allegations identified by GAP and SSAT	~140	(leaving ~200)
• Available allegations for onsite inspection selection	~200	

This sort also identified that out of the approximately 580 allegations collected by GAP, only 16 could be matched to a specific location, system, or component. The remaining 564 allegations referred only in general terms to items of concern. It should be noted that at this time, the SSAT had not yet interviewed the allegers to obtain specific information in support of the allegations. However, as indicated in Section 2.6, the additional information provided by the allegers via telephone conversations to SSAT members continued to lack specificity, with only a few exceptions.

Notwithstanding this lack of specificity, the SSAT performed an onsite inspection so a determination could be made about the safety significance of the allegations.

From the approximately 200 allegations, the SSAT selected 10 primary areas for onsite inspection at the STP facility; each area was identified by a given allegation (the "primary" allegation). In addition to the primary allegations, 61 secondary allegations were selected which conveyed similar concerns as the primary allegations. The 71 allegations selected by the SSAT represent approximately 36% of the total number of allegations that the SSAT considered as the only possible candidates for inspection. The selected allegations are representative of the technical concerns conveyed by the allegers represented by GAP, and bounded the 200 allegations. The selection was based on the safety significance; generic implications; specificity to a particular plant component, system, or structure; and was to provide a multidiscipline overview of the implementation and effectiveness of STP's Quality Assurance Program. Furthermore, the 16 allegations that included specific information were included as part of the 71 allegations selected for inspection.

The selected allegations encompassed the following areas: piping and mechanical components; valves; heating, ventilation, and air conditioning (HVAC); fasteners; welding; electrical cable and instrumentation; civil and structural; coatings; quality assurance and control; and polar crane and orbital bridge.

2.5 Inspection Plan

The SSAT members selected to perform the onsite inspection were the same individuals who reviewed, evaluated, and screened the GAP's allegations. Given the general, nonspecific nature of the allegations, the use of these experienced reviewers on the inspection team greatly facilitated the effort.

In view of the lack of specificity in many of the selected allegation areas, the SSAT took a broad look at the areas of concern.

The SSAT prepared detailed inspection plans; the plans included guidance for inspectors to ensure consistency in the inspection process. The plans also provided for combining other issues with the selected GAP allegations, where needed to ensure that the substance of the allegations did not reveal the identity of those allegers who may have requested anonymity. The plans focused on Unit 1 of STP, except for a few cases in which the allegations also made specific reference to construction irregularities in Unit 2. The SSAT inspection plans are outlined in Appendix B.

In addition to adhering to the inspection plan, the SSAT reviewed other sources of information such as NRC Region IV inspection reports pertaining to the resolution of allegations about the STP facility; Office of Nuclear Reactor Regulation (NRR) inspection data and safety evaluation reports; Houston Lighting and Power Company's (HL&P's) SAFETEAM records; and other documentation to determine whether these sources provide additional information related to an alleger's concern.

The SSAT conducted the onsite inspection during the week of January 18-22, 1988. The inspection involved personnel from the Region IV office as well as resident inspector personnel at the site who provided background information related to previous inspection activities at STP. During the site inspection, the SSAT inspected those areas related to the selected 71 allegations and focused its efforts on the safety significance of the technical concerns in those areas.

2.6 Interviews With Allegers

Because of the general lack of specificity and detail included in GAP's allegation files, the SSAT made arrangements with GAP to interview the allegers so that specific information could be obtained for those allegations that had been selected for inspection. The SSAT provided GAP with the allegations that had been selected, so that GAP could identify and contact those allegers whom the SSAT sought to interview. GAP identified 19 allegers involved with the selected allegations; however, only 10 of the 19 allegers could be contacted. According to GAP, these 10 allegers were people who had the most significant concerns. The SSAT interviewed them via telephone; GAP gave guidance to the allegers during the interview, and the conversations were transcribed. The interviews were conducted before and during the onsite inspection at the STP facility. Also, the SSAT conducted face-to-face interviews with 2 of the 10 allegers who had previously been interviewed by telephone; during these interviews, GAP was not involved and the conversations were not recorded.

GAP advised the allegers who were interviewed not to reveal their identities to the SSAT. However, two of the allegers did not follow this advice and revealed their identities to the SSAT. None of the allegers requested confidentiality agreements. Only one of the allegers interviewed expressed concern about his identity being revealed if questions were posed to HL&P and its consultants concerning the information he had provided to the SSAT. The SSAT adjusted the inspection plan to protect this alleger's identity.

As agreed, the distribution of the transcripts of the interviews with the allegers was limited to the members of the SSAT, NRC's Office of Investigations (OI), and GAP. In order to ensure that any future investigations would not be compromised, OI reviewed the contents of the transcripts to identify text concerning harassment/intimidation or wrongdoing that should be deleted from the transcripts before they were given to the allegers via GAP. The SSAT protected the identity of allegers whose names surfaced during these interviews, as well as during all phases of this effort.

Although GAP's cooperative presence facilitated the interviews with the allegers, with a few exceptions the additional information provided to the SSAT continued to lack specifics. The limited amount of specificity obtained from these interviews only required minor adjustments to established inspection plans.

2.7 Communications With Houston Lighting and Power Company

On January 18, 1988, the SSAT conducted an entrance meeting with representatives of HL&P and their engineering and construction consultants. HL&P introduced its SSAT counterparts and ensured that all of the necessary materials, site accesses, and personnel would be available for SSAT review. During the inspection, HL&P and its consultants promptly accommodated the SSAT's requests, greatly facilitating the inspection effort.

3 SUMMARY AND CONCLUSIONS

3.1 Inspection Findings

The SSAT found that several of the allegations selected for inspection at the STP facility had been substantiated at some point in the construction history. Plant personnel had successfully identified the concerns and had applied appropriate corrective actions when they implemented STP's Quality Assurance Program. This became apparent from the documentation of engineering, inspection, and special reviews within those areas that the SSAT examined. As a result of its inspection efforts, including interviews conducted with available allegers, the SSAT placed the allegations in the following categories:

Allegations	Total
• Substantiated	
- Deficiency corrected by HL&P	11
- Deficiency evaluated and determined to be acceptable "as is" by HL&P	2
- Deficiency found to be non safety related by SSAT	5
- Deficiency found by SSAT	3
• Unsubstantiated	
- No deficiency found by SSAT	21
- Lack of specificity, and generic review of area of concern performed by SSAT found no problems	29
• Total number selected for onsite inspection	71

Table 3.1 of this report gives examples of the type of allegations in each of the above categories. The deficiencies found by the SSAT related to the reinspection of Raychem cable splices, which is discussed in detail in Section 5.6 of this report. The actions required by HL&P to correct these deficiencies are presented in Section 4 of this report.

3.1.1 Allegations Inspected

The characterization of the 71 allegations selected for inspection at the STP facility are presented in Table 3.2, and includes a brief summary of the statements obtained by the SSAT from GAP's files, as augmented by information obtained by the SSAT when the allegers were interviewed. Also, this table shows other characteristics pertaining to the area of concern that were inspected by the SSAT, and the number of duplicated and other related allegations per category which have been closed as a result of SSAT inspections conducted at the STP site.

3.1.2 Balance of Allegations

As a result of the broad, generic, and programmatic look given to the areas of concern by the SSAT to compensate for the lack of specificity conveyed by the

Table 3.1 Summary Results of Allegations Selected for Onsite Inspection

Allegations	No.
Substantiated	
• Deficiency corrected by HL&P	11
Examples: (1) polar crane and orbital bridge track out of alignment, (2) valve remote manual operators interfering with conduit and structural beams, and (3) NSSS filter screens damaged during testing	
• Deficiency evaluated and left as is by HL&P	2
Examples: (1) Steam generator out of plumb and (2) concrete reinforcing bars (rebar) cut while concrete was being drilled	
• Deficiency found to be non-safety-related by SSAT	5
Examples: (1) Buried piping had no tie-rods and/or thrust block installed and (2) 2-inch-diameter pipe connection to tanks not reinforced	
• Deficiency found by SSAT (corrected by HL&P)	3
Example: One Raychem splice not reinspected for proper installation	
Unsubstantiated	
• No deficiency found by SSAT	21
Examples: (1) HVAC duct in emergency diesel generator building signed off as complete when it was not, (2) a deleted pipe whip restraint raised questions on the validity of the ASME N-5 reports and pipe supports attached to the restraint structure, and (3) primary coolant system instrumentation lines have only one root valve instead of two	
• Lack of specificity and generic review of area of concern performed by SSAT found no problems	29
Example: (1) HVAC welds not cleaned before coating, (2) 20% of valves installed backward, and (3) HVAC duct seal caulking could not withstand system pressures	
Total number selected for onsite inspection	71

Table 3.2 Characterization of Allegations Selected for Onsite Inspection and Disposition of Balance of Allegations

Category No.	Area	No. of selected allegations	Characterization of allegations	No. of duplicated allegations	Other characteristics inspected	No. of related allegations closed
1	Piping & mechanical components	9	Pipe joints not properly installed; pipe-to-tank connections inadequate; filter screens in NSSS loop damaged during testing; valves and pumps inaccessible for maintenance and operation; steam generator installed out of plumb; aluminum bronze pipe contains microorganisms that are detrimental to the equipment in the systems; questionable ASME N-5 documents when a pipe whip restraint was deleted from drawing.	3	Design control	1
2	Valves	4	20% of valves installed backward; 160 Limitorque valves not properly maintained; valves installed out of location; remote valve extensions interfering with conduit and pipe supports.	5	Design control Valve installation Valve maintenance	1 2 1
3	HVAC	10	HVAC welds not cleaned before painting; HVAC ductwork and supports not installed per specifications; material stolen from HVAC components and reused elsewhere; HVAC installed too close to other equipment--seismic tolerances violated; inadequate	5	HVAC installation Design control QC hold points HVAC fabrication	2 1 1 3

Table 3.2 (Continued)

Category No.	Area	No. of selected allegations	Characterization of allegations	No. of duplicated allegations	Other characteristics inspected	No. of related allegations closed
3 (Cont.)	HVAC		caulking used to seal ductwork; HVAC welds not in accordance with specifications; Unit 1 HVAC damper never tested--similar item in Unit 2 required replacement; wrong size angle iron used in HVAC supports; HVAC ductwork signed off as complete when it was not.			
4	Fasteners	11	Concrete anchor bolts not installed per procedure; fasteners from questionable U.S. and foreign countries used in plant; fasteners in plant do not meet specifications.	6	Counterfeit fasteners Fastener testing Fastener material certification	1 1 1
5	Welding	9	Weld rod traceability lost; faulty weld rod used all over; welders not certified; welds do not have welder's I.D.; weld I.D.s falsified.	3	Welding process QA welding program Weld documentation	4 1 2
6	Electrical & instrumentation	9	Raychem cable splices do not meet safety standards; nonconformance reports not written for improperly installed cable splices; cable pulled using a come-a-long; flex conduit not installed per requirements; weld splatter found on incore instrumentation guide tubes; additional radiation protection required for	9	Raychem splices Cable separation Flex conduit installation Conduit installation	1 1 1 1

Table 3.2 (Continued)

Category No.	Area	No. of selected allegations	Characterization of allegations	No. of duplicated allegations	Other characteristics inspected	No. of related allegations closed
6 (Cont.)			LWPS panel; reactor coolant instrument lines should have 2 valves instead of 1; flow transmitters removed after final inspections.			
7	Civil/ structural	4	Rebars drilled through; crack in basemat of fuel handling building; improper backfill used; backfill did not pass tests.	4		
8	Coatings	1	Coatings on orbital bridge flaking and chipping.	7	Inspector certification Coating procedures Surface preparation Coating integrity	1 4 1 1
9	QA/QC	10	ASME N-5 reports invalid; inadequate engineering and design; as-built items do not agree with as-designed configurations; inadequate field document control.	25	QA record traceability Material compatability System turnover QC inspection records Transition plan Document control Receipt inspection Bolt torque procurements Independent verification Contractor oversight	2 1 1 3 1 1 2 1 1 1
10	Polar crane & orbital bridge	2	Polar crane and orbital bridge have deficiencies that have not been corrected.	1		

Table 3.2 (Continued)

Category No.	Area	No. of selected allegations	Characterization of allegations	No. of duplicated allegations	Other characteristics inspected	No. of other related allegations closed
11	Non safety related	2	HVAC diffuser plate modified for Unit 2; similar item in Unit 1 not modified; cleanliness barrier violations; worker confidentiality.	3	QA conflict of interest	1
Totals		71		71		48

allegations, the SSAT inspected many other hardware and QA/QC-related characteristics. These are discussed in Section 5.1 of this report.

As soon as the inspection results of the selected allegations became available, the SSAT examined the remaining allegations to determine which of them needed further consideration, or had been satisfactorily resolved on the basis of the findings of the inspection.

The SSAT closed out some of the remaining allegations because they were found to be duplicates of the allegations selected for inspection. Other remaining related allegations were closed out because the concerns were already being covered by the SSAT inspection. Table 3.2 identifies the other characteristics inspected by the SSAT, as well as the number of duplicate and related allegations.

Many of the remaining duplicate allegations included concerns raised by the allegers that the deficiency conveyed by the primary GAP allegation was also not addressed on nonconformance reports. The SSAT addressed these issues if the system, component, or structure that was cited for an alleged deficiency was identified specifically enough. The SSAT determined that nonconformance reports had not been generated for many of the issues reviewed for the following reasons: The problem or deficiency was noted during in-process construction activities where final quality inspections were not yet called for; the item was being modified or changed as required by the engineering organization and described on a field change document; and the item was not safety-related, therefore (1) nonconformance reports are not written and (2) if the item was found to be deficient, that fact was addressed in engineering field change documents and/or in inspection reports.

As part of this examination, the SSAT used NRC Region IV inspection reports and HL&P's SAFETEAM investigation reports that were determined to offer additional insight on the allegations being reviewed by the SSAT. The SSAT evaluated these reports and found they addressed certain identical or related allegations that the SSAT was currently pursuing. It was determined that those allegations of interest to the SSAT were appropriately dispositioned in these reports. After the SSAT evaluated the contents of these reports, it used them to support SSAT findings; these reports provided the basis for resolving other allegations where applicable. The SSAT's results of this examination are presented below.

• Available allegations for onsite inspection selection	213*	
• Allegations selected for inspection	71	
• Subtotal		142
Balance of allegations		
- Duplicate	71	
- Related	48	
Subtotal		119
• Total remaining allegations		23

Of 213 allegations identified as possible candidates for inspection, 71 were inspected at the site and 119 were dispositioned for the reasons given above. Of the 23 remaining allegations, 4 were determined to be duplicated. The remaining 19 were grouped according to the allegation area conveyed by the characterization of the concern. Also, the applicable criteria of Appendix B to 10 CFR Part 50 related to the subject matter reflected by each allegation were identified by the SSAT. The results of this grouping are presented in Table 3.3.

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*Initial estimate in Section 2.4 was 200.

The SSAT determined that the 19 remaining allegations lacked specificity to determine whether they can be enveloped by the inspection performed by the SSAT. However, the SSAT found that the subject matter conveyed by the remaining 19 allegations involved the implementation of the QA criteria shown in Table 3.3 which have been evaluated by the SSAT, as indicated in Table 3.4, as part of its overall review of the effectiveness of the STP Quality Assurance Program and found to be acceptable. The SSAT, therefore concludes that these remaining 19 allegations could not be of immediate safety significance, and are considered closed until the time when specific information will justify further NRC review. It should be noted that any additional information pertaining to these 19 allegations, as well as other additional information pertaining to previous allegations, will be reviewed in accordance with the policy and procedures set forth in NRC Manual Chapter 0517, "Management of Allegations."

3.2 Overall Review Effort

The SSAT comprised 15 members of the NRC staff. They performed the initial screening of allegations at GAP's offices in Washington, D.C., and conducted the onsite inspection of selected allegations at STP. This inspection also involved NRC Region IV staff and resident inspector personnel at the site who provided background information related to previous inspection activities and gave substantive support to the SSAT.

The SSAT was also assisted by the Mechanical Engineering Branch and Material Engineering Branch of NRC's Office of Nuclear Reactor Regulation (NRR) to confirm the adequacy of analysis pertaining to the installation of NSSS components. Additional assistance was provided by various NRC offices in matters related to congressional and public affairs, allegation management, interviewing allegers and conducting investigations, and legal, administrative, editing, word processing, and telephone conference services support. Moreover, contractor personnel provided support in recording and transcribing SSAT's telephone conversations with the allegers.

Since November 19, 1987, when the initial assessment of the GAP's allegations commenced, until February 29, 1988, approximately 3335 NRC staff and contractor hours were spent in reviewing these allegations. A breakdown of these hours is included in Appendix A of this report.

3.3 Overall Assessment and Conclusions

In addition to determining the safety significance of any technical issues examined, an essential part of the SSAT's inspection effort was to focus on the QA aspects of each area examined. Table 3.4 shows the 10 CFR Part 50 Appendix B QA criteria that were evaluated in the allegation areas review by the SSAT. This focus was to determine if the QA Program at STP was effective in identifying, solving, correcting, and satisfactorily closing safety-significant, technical issues as well as those of programmatic concerns. The SSAT also measured the effectiveness of the assurance of quality in the responsible line organizations

Table 3.3 Characterization of Remaining Allegations and QA Criteria Involved

Area	Remaining Allegations	Characterization of Allegations	QA Criteria Involved
Piping & mechanical components	8	Inaccurate design calculations; inadequate pipe hanger design and installation; non-safety-related item tagged safety-related; equipment received without vendor instructions; inaccurate procedures were written; unresolved pipe hanger problem; acid dripping on stainless steel pipe; equipment manually assisted into alignment causing uncalculated stress conditions	Design control, inspections, identification and control of components; control of purchased materials, equipment and components; procedures and instructions; corrective actions
Electrical & instrumentation	1	Construction lacking QC documentation	Inspections; QA records
Coatings	2	Coatings not applied per procedures; poor coatings	Procedures and instructions
QA/QC	12	Inadequate discipline interface; nonconformance report not written for pipe hanger deficiency; HVAC gasket documentation missing; lack of equipment maintenance; craftspeople make mistakes; training records inaccurate; inadequate vendor QC documentation; missed QC hold points; inadequate operator training	Design control; nonconforming components; procurement document control procedures; inspections; QA records; audits; control of purchased materials, equipment and components Part of current operational readiness program

Table 3.4 Evaluation of QA Criteria in Allegation Areas

10 CFR 50 Appendix B quality assurance criteria Area	Design control	Procurement document control	Instructions, procedures, & drawings	Document control	Control of purchased material, equipment, & services	Identification & control of materials, parts, & components	Control of special processes	Inspection	Test control	Control of measuring & test equipment	Handling, storage, & shipping	Inspection, test, & operating status	Nonconforming materials, parts, or components	Corrective actions	QA records	Audits
Piping & mechanical components	Y	Y	Y	Y		Y	Y	Y	Y			Y	Y	Y	Y	Y
Valves	Y	Y	Y	Y		Y	Y	Y	Y		Y	Y	Y	Y	Y	
HVAC	Y		Y	Y		Y		Y	Y			Y	Y	Y	Y	
Fasteners	Y	Y	Y	Y	Y	Y		Y			Y		Y	Y	Y	Y
Welding		Y	Y	Y	Y	Y	Y	Y			Y		Y	Y	Y	Y
Electrical & instrumentation	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y		Y	Y	Y	Y	Y
Civil/structural	Y		Y	Y		Y	Y	Y	Y	Y		Y	Y	Y	Y	
Coatings	Y	Y	Y	Y	Y	Y	Y	Y				Y	Y	Y	Y	Y
QA/QC	Y	Y	Y	Y		Y		Y					Y	Y	Y	Y
Polar crane & orbital bridge	Y		Y	Y				Y					Y	Y	Y	Y
Non-safety-related	Y		Y	Y								Y				

for each area and issue examined. This was done because QA organizations are responsible for seeing that the programs of line organizations are in place and are being implemented. This is accomplished through a system of audits and surveillances. When problems are identified in a line organization, it is QA's responsibility to see that effective corrective actions are implemented and that the resolution of the identified deficiencies corrects the problem and not just its symptoms.

The SSAT determined that the QA and line organizations involved with the issues examined during the inspection have effectively assured that QA programs at all levels of implementation are in place and that any problems that arise are corrected satisfactorily. Except for a very few isolated instances, the SSAT determined that the engineering, construction, administrative, and managerial organizations at STP have been effective in ensuring that deficiencies are identified, solved, and corrected to preclude repetition.

The SSAT also determined that in many instances, the allegers' concerns did exist at one time during construction activities at STP. However, it appears that many of these allegers were not aware of the procedures for assuring quality that were in place during construction and that continue today.

In conclusion, the SSAT review of all of GAP's allegations has identified no substantive safety issue which would warrant delay in the NRC's consideration of a full-power license for STP Unit 1.

However, it should be noted that the overall assessment of GAP's allegations will not be complete until the NRC Office of Investigations (OI) completes its review of the harassment/intimidation and wrongdoing allegations. Upon completion of OI's efforts, the NRC technical staff will further review the safety significance of any technical concern spun from these investigations.

4 ACTIONS REQUIRED OF HOUSTON LIGHTING AND POWER COMPANY

4.1 Raychem Splices

As a result of its inspection in the electrical and instrumentation area of concern, the SSAT identified one deficiency. A Raychem cable splice was found in Unit 1 that had not been reinspected for proper installation as was required as part of an earlier reinspection program at STP.

On its own initiative, HL&P initiated a complete reexamination of Raychem splices in Unit 1 to verify that problems similar to the Raychem splice in electrical penetration EPA-17 that had not been reinspected do not exist in the plant.

The SSAT has reviewed HL&P's findings related to the reexamination of the reinspection of Raychem splices. The failure to include all splices in the previous reinspection program indicates the need to revise the existing procedures to ensure that future corrective action initiatives are complete and accurate.

Although the SSAT was not able to find similar problems in other construction disciplines, the corrective action program procedures involving all construction disciplines need to be modified to include verification of the input information used to ensure its completeness and correctness. The procedures should also require documentation of completed reconciliation of all items identified as potentially and actually being deficient and their verification should be included in corrective action procedures and processes.

Before ascension from 5% power for Unit 1, HL&P shall complete all modifications concerning the corrective action program implementing procedures in accordance with the above.

Before loading fuel into Unit 2, HL&P shall complete a reexamination of Raychem cable splices using the revised corrective action program implementing procedures and perform all corrective hardware and software actions found to be necessary.

4.2 Nuclear Steam Supply System Components

The SSAT sought the assistance of the NRC technical staff to further confirm the acceptability of HL&P's analyses for justifying vertically out-of-plumb tolerances of major nuclear steam supply system (NSSS) components in Unit 1. The NRC staff met with the HL&P staff and its consultants and concluded that the analyses had satisfactorily resolved the concerns. However, before ascension from 5% power for Unit 1, HL&P shall submit a report to NRC documenting the results of the analysis. Further review by the NRC staff, if required, will be documented in a separate report.

5 REVIEWS OF ALLEGATION CATEGORIES

5.1 Piping and Mechanical Components

5.1.1 Thrust Restraints for Buried Mechanical Joint Pipes

5.1.1.1 Characterization of Allegation

It is alleged that several buried piping systems have deficient mechanical joints. During an interview, the alleger expressed concerns that composite piping made from ductile iron and utilizing mechanical joints had been buried in the yard (before November 1984) without the required anchorage supports such as tie rods and thrust blocks. The interview also revealed that approximately six systems were involved, notably a 6-inch essential cooling water (ECW) system line. The alleger was concerned with this ECW line because the ECW system provides cooling for safety-related components during normal plant operations, as well as after a loss-of-coolant accident (LOCA), after a loss-of-offsite-power (LOOP) event, and after other design-basis events.

5.1.1.2 Details

The SSAT determined that most of the underground portion of the ECW system is a safety-related, seismically analyzed, and supported piping system. The safety-related piping is fabricated from an aluminum-bronze alloy material and was assembled using welded joints. The safety-related portion of the system does not utilize any mechanical joints that might require tie-rods and/or thrust blocks. The SSAT reviewed all information presented with the allegation and the documentation provided by HL&P during the inspection. These included such items as potential change notices (PCNs), engineering correspondence, American National Standards Institute/American Water Works Association (ANSI/AWWA) standards, pipe specifications, 24 composite piping drawings, piping and instrumentation diagrams (P&IDs), cost estimates for piping excavation, and a list of all mechanical joint pipe installed by Brown and Root (B&R) and Ebasco as of November 1984.

The SSAT reviewed three interoffice memoranda (IOMs) written by various civil/structural engineers and project engineers at the site concerning this issue. In IOM 31168, dated November 15, 1984, it was stated that, when the South Texas Project (STP) was being designed and constructed by Brown and Root, design of buried mechanical joint pressure pipe was the responsibility of the B&R Piping Group. However, when Bechtel was assigned design responsibility for the project, the responsibility was assumed by the STP Plant Design Group. During a field visit in March 1984, civil/structural personnel at the site noted that mechanical joint pipe was being buried without restraint devices. It was later recognized that restraint devices were not required by the plant design drawings or by any specification. The IOM also stated that markup drawings and several design document packages related to the mechanical joint pressure piping were available. These drawings and design documents showed which pipe was installed by B&R, and which pipe was installed by Ebasco before September 1984. A review of the design documents and any recommendations to avoid the excavation of pipe was requested in the IOM.

In response to IOM 31168, IOM 33293, dated November 20, 1984, stated that the submitted documents had been reviewed and it was concluded that thrust restraints must be provided on the installed pipes. The reasoning was that there is no mechanical mechanism to resist the longitudinal thrust forces and thus, without restraints, the joint may easily come apart under internal pressure, causing uncontrolled leakage. However, the IOM also stated that according to procedure, the installed pipes should have been hydrotested before backfilling took place and that temporary restraints should have been provided during testing. The memo also stated that such temporary restraints are often not removed by the contractor and that B&R and/or Ebasco may possibly have left them in place. If documentation is available that such restraints exist, excavation and the installation of restraints could be avoided.

On March 15, 1985, IOM 34161 was issued stating that conceptual designs were developed for the buried thrust restraints at bends of underground pressure pipes with mechanical joints. A list of the bends was prepared from the 24 marked-up plant design drawings and a type of restraint was recommended for each bend. A cost estimate developed from the conceptual designs was attached. A potential change notice (PCN) addressing the engineering concerns and construction costs for the pipe restraints described in the IOMs was initiated on March 12, 1985. Attached to the PCN was a list of all mechanical joint pipe installed by B&R and Ebasco as of November 1984 for six piping systems. The systems and pipe sizes involved were as follows: 6-inch essential cooling water system (EW), 6-inch essential cooling pond makeup (EP), 8-inch fresh water supply (SW), 8-inch and 6-inch well water (WW), 4-inch and 3-inch potable water (PW) and 8-inch and 4-inch service water supply (TW).

The SSAT reviewed the PCN issued on March 12, 1985 to determine what actions were taken by HL&P for the excavation and modification of the buried pipe. The SSAT was also provided with IOM 38180 indicating that a Design Change Approval Review Board (DCAR Board) met on July 8, 1985 and rejected the PCN. The DCAR Board concluded that leakage from pipes buried without restraints would not result in serious consequences (such as damage to safety-related systems, components or structures). In lieu of the verification and corrective action proposed in the PCN, the DCAR Board determined that area surface monitoring would be adequate. In view of this decision, a checklist and sketch C-635 showing the locations of potential leaks were prepared, for utilization of surface monitoring.

Shortly after the DCAR Board made its decision, some excavations incidentally exposed several mechanical joints with tie rods. HL&P determined that these joints were adequate and subsequently reduced the number of locations to be monitored. Uninspected joint locations remained on the checklist for visual monitoring during the inspection program. To aid in the monitoring, the existing soil over these areas was removed and limestone and crushed rock was put in placed over them to allow any leakage which might occur to rise to the surface above the joint for prompt identification and location of the problem. The SSAT also verified that plant design drawings for buried pipe were revised by design change notices (DCNs) to require thrust restraints in future applications.

The SSAT also reviewed the marked-up sketch C-635, the composite piping checklist, and several excavation backfill requests and determined that the actions being taken for monitoring potential leaks were acceptable.

The SSAT reviewed the composite drawings for the affected systems, all DCNs for pipe installed after September 1984, the P&IDs depicting the complete EW system, applicable piping and excavation specifications, and the marked-up sketch C-635. From this review, the SSAT determined that the buried lines without thrust restraints were classified as non-safety-related. Of note was that, although the EW system is safety-related, the 6-inch buried line of concern to the alleger was a non-safety-related portion and is used for discharging intake strainer backwash to the pond (a non-safety-related function). Several DCNs issued during and after September 1984 against the applicable composite drawings were reviewed and found to require the use of tie rods and thrust restraints for future installations. None of the piping or backfill specifications were found to be classified as safety-related.

5.1.1.3 Conclusion

The SSAT determined that this allegation was substantiated in part. Although it was found that some buried pipe was installed without thrust restraints, none of the affected lines were safety-related and adequate action was taken on this concern. Leakage from these joints can be monitored. The SSAT determined that an evaluation was performed by HL&P indicating that possible leakage would not affect safety-related systems, structures, or components.

5.1.1.4 Action Required

None

5.1.2 Full-Flow Filter Screen Failures

5.1.2.1 Characterization of Allegation

It is alleged that the reactor coolant system (RCS) needs to be inspected after approximately two hundred full-flow filter screens disintegrated during hot functional testing of the RCS.

5.1.2.2 Details

The SSAT reviewed a detailed Westinghouse report, WCAP-11506, dated June 1, 1987, entitled "Full Flow Filter Recovery and Equipment Assessment." The report stated that after completion of hot functional testing at South Texas Project Unit 1, which spanned 28 days under full-flow and operating temperatures, inspection of the full-flow filters installed on the lower core support plate in the reactor vessel revealed that 57 of the 192 filters had degraded. The filters were used during both cold and hot functional testing to help remove any debris from the primary coolant system. The Unit 1 filters had experienced certain degradations ranging from small tears or holes in the screen material to the complete loss of four filter screens (see Figure 5.1-1). As a result, the filter debris circulated throughout the primary coolant system and parts of the attached auxiliary systems after the failure of the filters.

The Westinghouse report discussed the design of the full-flow filters, the results of inspections performed on equipment in the primary coolant and certain auxiliary systems, results of metallurgical examinations performed on the filters, and the evaluations of the effects of the unrecovered filter debris on equipment. Additionally, the report contained a safety evaluation justifying operation of the plant with unrecovered filter debris.

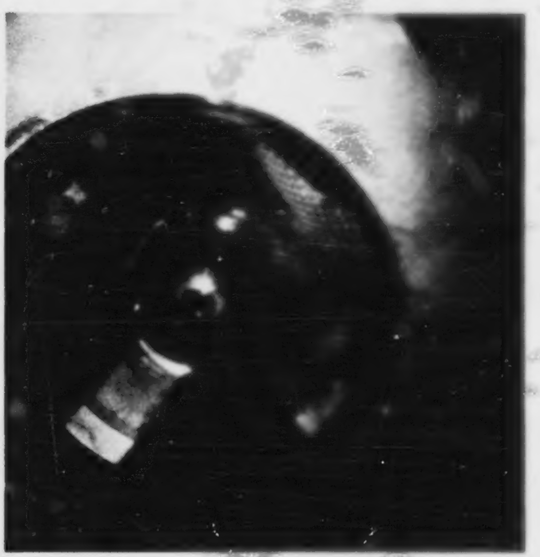

Figure 5.1-1 Damaged Full-Flow Filter Screen
(View Looking Up Into Reactor Vessel)

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The NRC Office of Nuclear Reactor Regulation (NRR) had also reviewed this Westinghouse document in its evaluation of this incident. The results were provided in safety evaluation report (SER) input, dated October 8, 1987, entitled "Full Flow Filter Recovery and Equipment Assessment." The SER provided the results of the NRR staff's review and evaluation of HL&P's activities to address the effects of filter debris on the equipment exposed during the hot functional test and operability of equipment with unrecovered filter debris in the reactor coolant and auxiliary systems. The SER concluded that the results of the plant inspection performed by HL&P indicated no evidence of physical damage that would prevent the safe operation of the plant, including the fact that the plant would not be affected even if unrecovered filter debris remained in the system. The NRR staff concluded that the unrecovered filter debris did not constitute a threat to the safe operation of South Texas Project, Unit 1. In addition, NRC Region IV personnel inspected HL&P's effort to recover the missing filter material and concluded that the search had been thorough. The results of this inspection are documented in Inspection Report 87-08.

5.1.2.3 Conclusion

The SSAT determined that this allegation was substantiated in part because the full-flow filters did experience some degradation. However, the number of filter screens which experienced some form of degradation was 57, not 200 as originally alleged. Also, the problem had been fully evaluated by Westinghouse and HL&P. The NRC staff had reviewed the results of this evaluation and inspection and concurred that the operability of the unit would not be affected. The SSAT also concurred with these findings.

5.1.2.4 Action Required

None

5.1.3 Pipe-to-Tank Connections

5.1.3.1 Characterization of Allegation

It is alleged that 2-inch pipe nozzles require reinforcements at tank connections. This allegation concerns the situation in which no reinforcements were provided at nozzles where five 2-inch pipes were connected to five separate tanks.

5.1.3.2 Details

The SSAT examined all of the above-mentioned 2-inch pipe nozzle connections in rooms 057, 059, 059B, 061, and 071 of the mechanical auxiliary building, South Texas Project, Unit 1. The tanks involved were the waste evaporator condensate tank, the laundry/hot shower tank 1A, the LWPS (liquid waste processing system) monitor tank 1A, the floor drain tank 1A, and the waste holdup tank 1A. These tanks were listed by HL&P as non-safety-related components. The SSAT inspected each of the nozzle connections and found each of the lines to be adequately supported and the nozzle connections to be adequately welded.

The SSAT also performed a detailed review of HL&P's design calculations for the nozzle connections which included the specifications describing the technical requirements applicable to the design, fabrication, inspection, and installation of the tanks. Specification 5R019NS0014, Revision 2, dated April 28, 1987, entitled "Specification for Field-Erected Stainless Steel Tanks," was applicable to floor drain tank 1A; the other tanks were covered under specification 7Q249NS017-D, Revision E, dated May 9, 1983, entitled "Specification for Shop Fabricated Atmospheric Tanks."

The SSAT also reviewed the design drawings of the as-built piping configurations as well as their corresponding mathematical models used for computer analyses. For the proposed simple static analyses, the models were found to represent the field configurations adequately. In all the cases reviewed, the SSAT determined that the stresses calculated at the nozzles were well within the allowables required by the specifications.

It should be noted that this allegation had been covered under two other independent investigations: one by the licensee's SAFETEAM (concern 11227), the other by NRC Region IV (Inspection Report 87-30). Both investigations concluded that the nozzle connections had sufficient strength without reinforcement.

5.1.3.3 Conclusion

The SSAT determined that this allegation about lack of reinforcements at 2-inch pipe nozzle connections to the tanks was not substantiated. The stress analysis of the 2-inch pipes indicated that the nozzle stresses were well within the allowable stresses. In addition, the five tanks that were involved in the allegation are non-safety-related.

5.1.3.4 Actions Required

None

5.1.4 Steam Generator

5.1.4.1 Characterization of Allegation

It is alleged that steam generator (SG) 1-D was installed out of plumb so that the steam outlet nozzle is 11 to 13 inches from its required position. This would require piping and support modifications that could affect the original load and stress analysis for those components.

5.1.4.2 Details

The SSAT requested all information on the steam generator issues in order to determine if the steam generator was installed correctly.

The SSAT reviewed nonconformance report (NCR) BN-00035, dated March 2, 1983, for SG 1-D. The NCR description stated that SG 1-D (or 4) had been determined by optical survey to be out of plumb approximately 0.157 inch per foot, or approximately 0.75 degree. NCR BN-00035 was dispositioned "use-as-is" since the existing verticality of SG 1-D (4) had been evaluated as acceptable by Westinghouse as stated in letter ST-WY-YS-00023, dated March 7, 1983. The disposition also stated that the additional questions raised by Bechtel Engineering in letter ST-YS-WY-00030, dated March 14, 1983, were satisfactorily answered and supplementation of Westinghouse's rationale was made available in Westinghouse letter ST-WY-YS-00026, dated March 4, 1983.

The SSAT reviewed Westinghouse letter SY-WY-YS-00022, dated March 7, 1983, entitled "SG #1, #2, #3 and #4 Plumbness." The letter stated that, based on refinement survey data received from Bechtel Engineering, Westinghouse accepted the verticality (plumbness) of SG 2 and 3 since the plumbness for these was within the recommended tolerance of 0.5 degree, maximum. However, Westinghouse indicated that SG 1 and 4 were outside of the recommended tolerance and that further review was required for their acceptability.

The SSAT also reviewed Westinghouse letter SY-WY-YS-00023, dated March 7, 1983, entitled "Steam Generator #1 and #4 Plumbness." The letter stated that Westinghouse design engineers have reviewed the refined survey data for SG 1 and 4 and made an evaluation for possible effects on performance characteristics, system analysis, structural and design analysis, seismic analysis, and piping analysis. On the basis of these, Westinghouse recommended that Bechtel Engineering accept the present location of the steam generators.

On March 14, 1983, Bechtel Energy Corporation (Bechtel) issued letter ST-YS-WY-00030 in response to the Westinghouse evaluation. The letter requested further clarification of several questions that resulted during Bechtel's review of the Westinghouse letter. These questions raised concerns over the potential effects on stress in the SG tubes and tubesheet, design assumptions in the ASME design report, and the level indication components. On March 14, 1983, Westinghouse responded to these items in letter ST-WY-YS-00026 and satisfactorily addressed the Bechtel concerns.

In addition to these letters, the SSAT reviewed the Westinghouse Mechanical Service Manual, Vol. I, Section IV, Paragraph 11, dated April 19, 1978, that was utilized for the final alignment of SG 4 (1-D), the construction operation

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traveler 35-1197, dated August 8, 1979, which was utilized for final SG alignment acceptance by QA/QC, the SG Manufacturers Data Report, dated June 15, 1982, the Brown and Root (B&R) composite piping drawings 5C-15-1D-5016 and 5035, and a letter discussing the plumbness of the remaining three steam generators, 1, 2, and 3 (Westinghouse letter ST-WY-YS-00027).

The SSAT questioned the effect that the out-of-plumbness condition of SGs 1 and 4 had on other components in the nuclear steam supply system (NSSS) loop. The STP staff presented to the SSAT a report entitled "Status of NSSS Related Non-Conformance Reports," dated August 8, 1983, provided to Houston Lighting and Power Company (HL&P) by Bechtel Energy Corporation. The report stated that, after identifying the SG anomalies, a survey and review of the as-installed condition of all NSSS equipment in Units 1 was undertaken. The equipment found to be nonconforming was documented in the report along with the actions necessary to resolve the condition. The paragraphs that follow summarize the conditions noted in the report.

(1) SG Upper and Lower Lateral Restraints

The generators are displaced by varying amounts relative to the upper and lower lateral restraints, because of the inclination of the steam generators. As a result, nonconformance reports (NCRs) were issued to document the problem.

Westinghouse reviewed the nonconforming condition and stated that the out of plumbness was not severe and only minor modifications would be necessary to ensure an adequate support system.

After the modifications were implemented, Westinghouse issued letter ST-WN-YB-1468, dated February 12, 1985, stating that a review performed for the applicable NCRs and as-built measurement information for the lateral supports had determined that the supports were acceptable as installed.

(2) SG/Reactor Coolant Pump Vertical Supports

Detailed surveys were performed that indicated the following items associated with the SG/RCP vertical support columns were misaligned:

(a) Column base plates are rotated with respect to the anchor bolt pattern.

(b) Columns exhibit lack of parallelism with respect to each other.

(c) Columns do not exhibit correct inclination towards the reactor.

(d) Columns have transverse inclination with respect to the reactor.

(e) Columns are rotated with respect to the bases and SG adapters.

(f) Equipment columns are eccentric to slab support columns in excess of allowable tolerances.

As a result, NCRs were issued and Westinghouse performed an analysis which indicated that the concerns associated with items a through e were not significant from a stress analysis or operability standpoint. It was also stated that the concerns associated with the eccentricity of the columns, item f, would be resolved by shifting the equipment support base plates to meet the Bechtel tolerance requirements. In those cases in which the required tolerances could not be met by shifting the base plates, it was stated that analyses would be performed to ensure that the load limits on both the structural and equipment supports were not exceeded.

This issue was also discussed in the Westinghouse correspondence dated February 12, 1985 and found to be acceptable as installed.

(3) Reactor Coolant Pump

Surveys were taken that indicated the reactor coolant pumps (RCPs) deviate from the design cold position by small amounts.

Westinghouse stated that design tolerances are not specified for the RCP centerline displacements and that proper fitup is assumed to occur by the RCP cold-leg fitup to the pump discharge nozzles. Also, an as-built stress analysis was performed which verified the acceptability of the system.

On the basis of this information, no NCRs were issued on this item.

(4) Steam Generator Piping

Since the steam generator nozzles were displaced laterally by the lean of the steam generators, some modifications in the piping attached to the steam generator was necessary.

Detailed surveys were taken to determine the required layout for the main steam, feedwater, and auxiliary feedwater lines. NCRs were issued for those lines that did not fit up properly with their respective nozzles. Affected piping was modified in the field and in the shop as necessary to provide proper fitup.

(5) Reactor Vessel

Surveys taken on the reactor vessel indicated that the reactor vessel core support ledge was unlevel by an amount greater than the allowed tolerances. The surveys indicated that the slope exceeded the Westinghouse acceptance criteria as restated in the Brown and Root quality construction procedure A040K PMCP-10.

The tolerance requirements specified by Westinghouse were identical to those specified for other Westinghouse reactors. The tolerance requirements for the ledge ensured that the core barrel retained its verticality by a specified amount, thus facilitating linearity and proper fitup of all reactor components.

Additional optical surveys were taken to verify the slope of the core support ledge. After reviewing these data, the preliminary evaluation indicated that two separate but related concerns existed. First, there apparently was a tilt of the vessel that may have been associated with the differential settlement of the basemat of the reactor containment building (RCB). The second concern was associated with the waviness of the core support ledge; this may exceed the Westinghouse flatness criteria.

On October 14, 1983, Westinghouse addressed the two concerns via letter ST-WN-YB-629 entitled, "Evaluation of Reactor Vessel Tilt and Waviness." The correspondence stated in part, that Westinghouse has evaluated the reported conditions and concluded that out-of-levelness condition of the reactor vessel support ledge and mating surface does not constitute a safety hazard and that the plant may operate without repair. Westinghouse also stated that the reactor vessel tilt results in no significant impact on the reactor's operation, reactor vessel nozzle loads, or piping/support loads.

HL&P has been monitoring the differential settlement of all vital structures from the beginning of construction in accordance with the FSAR commitments. The SSAT reviewed the differential settlement data for the reactor containment building and noted that settlement has remained within the design tolerances. In addition, the SSAT sought the assistance of the NRC staff to further confirm the acceptability of HL&P's analyses for justifying out-of-plumb (verticality) condition of the steam generators and the other out-of-tolerance conditions noted with major NSSS components in Unit 1.

5.1.4.3 Conclusions

The SSAT determined that this allegation was substantiated in part. Although the condition relating to the verticality of steam generator 1-D was found to exist, the condition was analyzed and evaluated to be acceptable, documented properly in a nonconformance report, and satisfactorily dispositioned.

The NRC staff has met with HL&P and its consultants and concluded that the analyses had satisfactorily resolved the concerns.

5.1.4.4 Action Required

Before ascension from 5 percent power for Unit 1, HL&P shall submit a report to NRC documenting the results of the analysis. If further NRC staff review is required, the staff will prepare a separate safety evaluation report (SER).

5.1.5 Reactor Coolant System Pipe Whip Restraint

5.1.5.1 Characterization of Allegation

It is alleged that pipe whip restraint RC1125-R1 was deleted from the design drawing via a field change request (FCR) in April 1987. This restraint has three Class 1 large-bore feedwater pipe supports attached to it. The restraint is located in the intercorridor of the reactor containment building, Unit 1, Room 201. An N-5 code data report was generated at the same time that the FCR was written. This makes questionable the information in the N-5 code data report and the traceability of the attached pipe supports.

5.1.5.2 Details

The SSAT reviewed the reactor coolant pipe whip restraint design drawing RC-1125-R1 and all associated design documentation for the large-bore pipe supports that have remained attached to the pipe whip restraint structure. The large-bore pipe support design drawings reviewed were FW-9012-HLS011, Revision 1, and RC-9125-HL5007, Revision 4. The SSAT performed a field walkdown to assure that the subject supports were the only two large-bore attachments to the pipe whip restraint. The SSAT also inspected, in a limited way, the as-built configuration of the large-bore supports to verify items such as utilization of correct material, support location and orientation, load settings, heat numbers, and material traceability (see Figures 5.1-2 and 5.1-3). Each of these areas was found to be acceptable. In addition, this information coincided fully with the documentation provided in the applicable N-5 code data reports reviewed by the SSAT.

The SSAT also reviewed the calculations for the large-bore pipe supports and the procedures governing the design coordination process in which pipe support designs that are to be attached to civil/structural restraints are forwarded to the Civil/Structural (C/S) Department for review. The SSAT reviewed two support interface load sheets for pipe supports FW-9012-HL5011 and RC-9125-HL5007 and procedure PED-027 entitled, "Civil/Structural (C/S) Directive for the Review of Pipe Support Drawings." Section 3.1 of the procedure states in part, that pipe support drawings are to be reviewed by the C/S Department to assure that the structural elements, such as beams, columns, slabs, and walls, are properly loaded. Support interface load sheets are to be submitted to the C/S Department upon completion of engineering design of the support. A review by the C/S Department is not a "hold point" for the initial issuance of support drawings. If any corrective action is required by the C/S Department, it is indicated on the pipe support drawing returned to the pipe support group by memorandum to be incorporated by the pipe support group in the next revision of the drawing. The SSAT found that these procedures were adequate.

The SSAT reviewed calculation CC-5944, file C-37, Revision 7. Information on the calculation cover sheet indicated that the calculation for pipe whip restraint RC-1125-R1 had been deleted because the energy-absorbing-material (EAM) section of the pipe restraint was removed. However, there is a possibility for it to be reactivated in the future. It also stated that portions of the restraint that were installed are being used as pipe support structures. However, because the design pipe whip restraint loads are so large compared to the pipe support loads, no analysis needs to be performed. On this basis,

Figure 5.1-2 Feedwater Pipe Shock Suppressor (FW-9012-HL 5005) Attached to Reactor Coolant Pipe Rupture Restraint (RC1125R1)

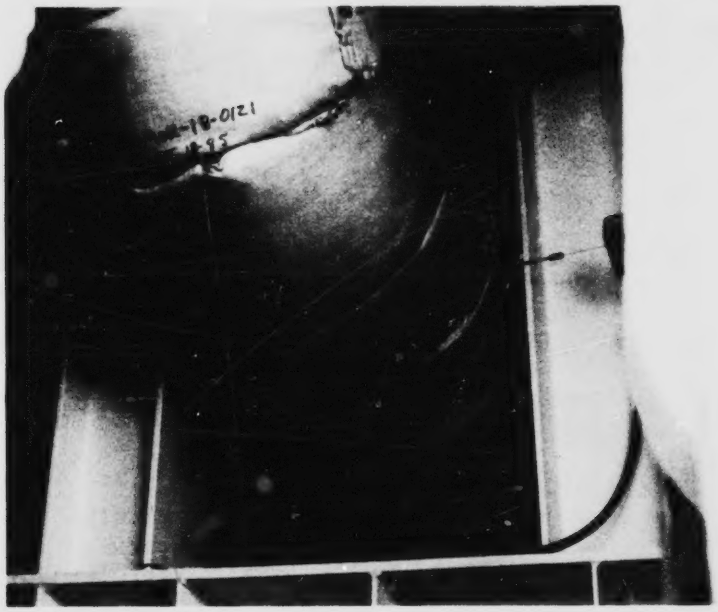

Figure 5.1-3 Feedwater Pipe and Rupture Restraint Structure Attached to Reactor Coolant Pipe Rupture Restraint (RC1125R1)

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this calculation was prepared as a reference only, and should the pipe whip restraint be reactivated, the reference drawings, specifications, and other applicable data must be checked for consistency at that time.

While reviewing the design drawing for the pipe whip restraint, the SSAT noted note 7 which stated that: Based on the revised analyses, the pipe whip restraints defined on the drawing were not required; the pipe whip restraint support structures that are already erected may be left in place, provided that the constructor document completion of the structural erection and successful acceptance inspection of the completed work through established procedures; and structures that are partially erected or questionable because of uncertain completion, or not documented as completed and inspected, shall be removed.

However, the SSAT also noted a revision to the drawing that added note 5 which stated that no additional attachments are to be made to this (pipe whip) restraint. The SSAT informed HL&P that this note could be misinterpreted by other engineering disciplines and should be removed or revised to restrict attachments unless approved by civil/structural engineering personnel. Before the end of the inspection, the Civil/Structural Department reviewed all design drawings for Units 1 and 2. No other notes of this type were found, and the above note was corrected; this was verified by the SSAT.

5.1.5.3 Conclusion

The SSAT determined that this allegation was not substantiated. The design documentation that was developed to remove the structure as a pipe whip restraint was adequate as well as the design documents and code data reports for the attached feedwater pipe supports.

5.1.5.4 Action Required

None

5.1.6 Aluminum-Bronze Piping

5.1.6.1 Characterization of Allegation

It is alleged that the design of the essential cooling water (ECW) system is inadequate. Specifically, the alleger is concerned that the aluminum-bronze pipe used in the ECW system does not have adequate wall thickness to compensate for metal loss from microbiologically induced corrosion (MIC) over the life of the plant, and that later in plant life the piping could fail because of settlement or a seismic event. The alleger is further concerned that this pipe has been subjected to MIC for many years before the ECW system was placed in service. The alleger is also concerned that corrosion debris could enter ECW pumps and other system components, thereby rendering the ECW system incapable of performing its safety function.

5.1.6.2 Details

MIC has been and continues to be addressed on a generic basis by the NRC staff. IE Information Notice 85-30, "Microbiologically Induced Corrosion of Containment Service Water System," dated April 19, 1985, addresses the subject of MIC. In this notice, the NRC staff acknowledged the potential for bacterial growth under almost any conditions, and described some general methods for inhibiting MIC.

Some of the methods for inhibiting MIC discussed in the notice include treating the water with chemicals, using cathodic protection systems, and instituting procedures to ensure that systems are not subject to low flow rates or stagnant conditions that favor biofouling and concentration cell corrosion.

The SSAT has reviewed the STP ECW system design and operation to determine if the recommendations contained in the notice are being implemented. The following is a summary of SSAT findings:

- STP has implemented procedures that call for treating the ECW operating loops (there are 3 ECW loops per unit - 2 are generally in service) with additions of sodium hypochlorite and sodium bromide three times a day. This combination of chemicals has been very effective in preventing biofouling at STP.

- ECW loops which are not in operation are operated for short periods every week to preclude stagnation and possible biological growth.

- ECW loops that are to be shut down for more than 7 days are treated with sodium hypochlorite and sodium bromide before shutting down.

- The ECW system is a partially closed loop system. Water is taken from the essential cooling pond (ECP), is pumped through the ECW operating loops, and is discharged back to the ECP. Heat picked up from ECW equipment is dissipated to the atmosphere. Makeup water to compensate for evaporation and bleed off to maintain water quality are added as required. With this design, chemical water treatment introduced into the ECW operating loops every day eventually is discharged into the ECP, resulting in some residual chemicals being maintained in the ECP. Thus, the source of water for the ECW loops is somewhat protected against biological fouling.

On this basis, the SSAT has concluded that the licensee has implemented the recommendations of IE Information Notice 85-30 with respect to inhibiting MIC.

In addition to the measures for inhibiting MIC described above, the ECW system is so designed that there are numerous places where the system can be inspected for the presence of biological fouling. Some of these places are discussed below.

- The component cooling water (CCW) heat exchanger water boxes are connected to the 36-inch pipe coming directly from the ECW pumps. When the water boxes are open, it is possible to inspect the large-bore pipe for a distance of approximately 8-10 feet. Also, if necessary, the ECW loops can be drained and the large-bore pipe can be made accessible for inspection for even greater distances.

- There is a low-flow area next to the tube sheets on the outlet side of the heat exchangers. Since biological fouling increases as flow rate decreases, the outlet side of the heat exchangers would be the logical place for biological fouling to begin, if it were to occur at all. All heat exchangers in the ECW system are accessible for inspection.

- Biological fouling tends to block flow in small-bore piping. The smallest diameter pipes in the ECW system are the tubes in the emergency diesel generator (EDG) fuel oil (FO) heat exchanger. If biological fouling were to occur in small-diameter piping (heat exchanger tubes), it would occur first in the EDG FO heat exchanger. This heat exchanger is readily accessible for inspection.

The design of the ECW systems at STP makes it possible to inspect for the presence of biological fouling in large-bore pipe, small-bore pipe, and in regions of low flow. An indication of biological fouling in any of these areas would serve as an indication that corrective actions would be required. By procedure, STP's chemical engineering personnel are notified whenever any portion of the ECW systems are opened for inspection or maintenance so that the opened portion of the system can be inspected for biological fouling. If any bacteria are found in the ECW systems, HL&P has the capability on site to determine whether or not the bacteria present could cause MIC.

The SSAT has determined that a portion of the underground pipe in the ECW system was physically inspected before the system was placed in service. The results of this inspection show that some small bacterial growths were found, but there was no indication of pitting of the pipe as is typical when MIC is present. The amount of bacterial growth found was minimal and would not affect flow in the underground pipe.

In addition to the chemical water treatment and the physical inspection capability, the performance of the ECW system can be monitored and used as an indicator of the presence of biological fouling. Reduced flow rates and/or changes in heat transfer through heat exchangers are positive indications that biological fouling may be occurring. System performance is monitored on a regular basis.

5.1.6.3 Conclusion

The SSAT determined that the allegation was not substantiated. Although it is possible for MIC to occur in the ECW system at STP, the SSAT found that the measures taken to inhibit bacteriological fouling are adequate. Should such fouling occur, HL&P has adequate procedures and inspection capability to ensure early detection which would allow corrective actions to be implemented before significant damage is done. On this basis, the SSAT concludes that using the aluminum-bronze piping in the ECW systems at STP is acceptable.

The NRC staff is still evaluating the resistance of aluminum-bronze piping to MIC. There is some evidence that aluminum-bronze piping is less susceptible to MIC than carbon steel or stainless steel pipe. The NRC staff will continue to review this issue as part of its generic study of MIC. The SSAT determinations, however, would only be reinforced should it be shown that aluminum-bronze piping has a high resistance to MIC.

5.1.6.4 Action Required

None

5.1.7 Equipment Accessibility

5.1.7.1 Characterization of Allegation

It is alleged that the design of STP is inadequate because provisions were not made for accessibility to pumps, motors, valves, gauges, and other equipment, for operation, maintenance, and repair. It is also alleged that the STP design is in violation of 10 CFR Part 50, Appendix B, Criterion III with respect to accessibility. Two allegers identified three concerns of a similar nature regarding the design of STP. An interview was conducted with one of the allegers, who provided additional information, as indicated below, in support of his allegations.

5.1.7.2 Details

Two of the three allegations regarding STP design (see Section 5.1.7.1) were raised by the same individual. The SSAT interviewed this alleger. During the interview, the SSAT asked the alleger to provide specific details with respect to systems, locations, and components that were inaccessible. The alleger did not respond directly to the requests for specifics from the SSAT. Instead, the alleger agreed to show the concerns (a stated total of 72) to the SSAT.

The second alleger was not made available for interview by the SSAT. Consequently, no specifics were provided as to system, component, or location.

The individual expressing numerous concerns regarding accessibility was initially identified only by a number, but was subsequently identified by name. During the review of onsite records, the SSAT determined that the same individual had raised numerous identical concerns during plant tours in the latter part of 1986. The records also showed that all of the alleger's concerns had been reviewed and dispositioned by HL&P's SAFETEAM. When the SSAT interviewed the alleger by telephone, the alleger made a reference to reports he had received relative to his concerns. The records reviewed showed that the HL&P's SAFETEAM had corresponded with the alleger regarding the disposition of his concerns. Based on the records at STP and the interview of the alleger, the SSAT then concluded that the concerns raised in the allegation given to GAP are the same concerns the alleger gave to the HL&P SAFETEAM. Subsequently, the SSAT determined that an independent audit of the SAFETEAM's investigations of the alleger's concerns would be more productive than a site tour to revisit these concerns with the alleger.

The SSAT selected a representative sample of the alleger's concerns and independently reviewed HL&P SAFETEAM's investigation and disposition of these concerns. At the conclusion of the review, the SSAT could find no reason to disagree with the STP SAFETEAM findings.

NRC Region IV Inspection Reports 87-07 and 87-30 also address an assessment of the SAFETEAM findings related to these issues. The SSAT reviewed these reports and concurred with the results.

In addition to the above review, during walkdowns of several systems at STP, the SSAT was looking for specific instances where inaccessibility of components had created a safety concern. At the conclusion of the SSAT inspection at STP, no such conditions had been identified.

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5.1.7.3 Conclusions

The SSAT determined that the alleger's concerns are almost all associated with non-safety-related systems and components. In the isolated instances where a safety-related component was involved, the SSAT determined that those cases did not impact safe plant operation or shutdown. On this basis, the SSAT determined that the allegations regarding inaccessibility of pumps, motors, valves, gauges, and other equipment were not substantiated with respect to safe plant operation and shutdown.

With respect to the allegation regarding 10 CFR Part 50, Appendix B, Criterion III violations, the SSAT was unable to establish that safety-related systems and components were involved. Thus, the SSAT determined that this allegation was also not substantiated.

5.1.7.4 Action Required

None

5.2 Valves

5.2.1 Valve Installation

5.2.1.1 Characterization of Allegation

It is alleged that incorrect installation of valves has resulted in 20 percent of the valves having the wrong orientation to the system flow (i.e., installed backwards). In an interview, the alleger provided no additional information about the location or type of valves.

5.2.1.2 Details

The SSAT reviewed the applicable documents controlling the installation of valves including standard site procedure SSP-10, Revision 4, 1987, entitled "Installations and Field Fabrication of Piping," and SSP-18, Revision 4, 1987, entitled "General ASME III Welding Requirements." These documents provide detailed guidelines for valve installation procedure, location, and orientation. Particularly, they require that unless specifically shown differently on the design drawing, valves with the valve orientation markings, such as flow arrows, shall be oriented in the same direction as the flow arrows for the lines shown on the isometric drawings. The SSAT attempted to obtain specific information regarding system, location, and valve types involved from the alleger. However, no such information could be obtained. The only information that the alleger provided was that in an unnamed plant construction progress report, a statement was noted that 20 percent of overall equipment items (pumps, valves, instruments, etc.) had not been completely installed at the time. No specific mention was made by the alleger, however, about the type of installation deficiencies such as misorientation of valves. Thus, in view of the lack of specific installations, the SSAT's approach for the resolution of this concern included the performance of a generic review and inspection of valve installations in STP Unit 1.

As stated previously, a review of the controlling documents indicated the existence of detailed procedures for valve installation. The SSAT then proceeded with the review of the actual records wherein the procedures were implemented. This included QC inspection reports for valve installation for both flanged and welded connections. Two systems were selected for in-depth review, the chemical and volume control system (CVCS) and the component cooling water system (CCWS). QC inspection reports were reviewed for the various types of valves installed in these systems and found to be satisfactory. Also, no nonconformance reports could be identified that were directly related to the alleged backward installation of valves.

The SSAT also reviewed the installation of valves in the auxiliary feedwater system to determine if any of these valves had been installed backwards or had been already replaced because of intergranular stress corrosion cracking (IGSCC). The SSAT determined that inspections for quality found that some prefabricated drain valve and pipe assemblies had been installed backward and were evaluated to be acceptable as is since the function of those valves was not affected by their orientation. There were no records indicating that valves in this system had been been replaced because of IGSCC.

Correct valve orientation was further confirmed through an independent plant walkdown by the SSAT. Approximately 70 valve installations of various types were inspected. The systems covered were safety injection system, reactor coolant system, chemical and volume control systems, component cooling water system, auxiliary feedwater system, and emergency cooling water systems. The SSAT found that, with the exception of gate valves and ball valves, arrow indicators were visible on the valve bodies (e.g., check valves, globe valves, and butterfly valves) and were in agreement with the flow directions shown on the isometric drawings. As for those gate and ball valves inspected, the SSAT concurred with HL&P's assessment that the valve orientations had no significance on system performance.

In addition, SSAT conducted an extensive review of the preoperational test reports for the CVCS and the CCWS. The primary objective of this review was to determine if there were any anomalies in the system performance during testing which were attributable to valve misorientation and whether this resulted in issuance of nonconformance reports. The review indicated that although some nonconformance reports had been issued, none were issued as a result of valve misorientation.

5.2.1.3 Conclusion

The SSAT determined that the allegation regarding backward installation of 20 percent of valves was not substantiated. The SSAT found no evidence that valves were installed backwards at STP, Unit 1.

5.2.1.4 Action Required

None

5.2.2 Valve Maintenance and Reassembly

5.2.2.1 Characterization of Allegation

It is alleged that approximately 160 valves with Limitorque operators did not receive proper maintenance before installation. It is also alleged that when valves were removed from systems for reworking, various parts were interchanged during reassembly, the valves were mislocated when reinstalled, and the flanged connections were not properly torqued. In addition, it is alleged that valves were received with vendor-applied, inorganic, zinc coatings that were not adequately cured and were removed from the valve and operator assembly by sandblasting.

5.2.2.2 Details

Since no specific information about systems, locations, and types of alleged valves was available, the SSAT conducted a generic review of the subject matter conveyed by the allegations. The SSAT reviewed standard site procedures SSP-10, Revision 4, dated December 23, 1987, "Installation and Field Fabrication of Piping," and SSP-18. Revision 4, dated December 31, 1987, "General ASME III Welding Requirements," to verify the requirements and guidelines for pre-installation inspection and installation of valves. The SSAT also reviewed SSP-24, Revision 2, dated December 31, 1987, "Disassembly/Reassembly of Safety and Non-Safety-Related Valves," for the detailed guidelines of QC verification of each applicable disassembly and reassembly step.

SSP-48, Revision 4, dated November 19, 1987, "Equipment or Component Interchanged," was also reviewed. This procedure provides instructions for permanent plant equipment, components, or material interchange between Units 1 and 2, or any locations within either unit or common facilities that require identical items. The SSAT understood that this procedure applied to equipment, components, or materials purchased to the same specifications, that meet designed equipment qualifications, are physically identical, and have identical performance characteristics, but differ only in name tag identification.

In reviewing these documents, the SSAT found that detailed procedures and guidelines were in place which were able to identify and eliminate all the potential areas of concern stated in the allegations. This procedural review was supplemented by the SSAT review of STP QC inspection reports for an extensive list of valves in the CVCS and the CCWS, as reported in Section 5.2.1. In all cases, either no nonconforming condition was identified, or for those nonconforming conditions found, corrective actions had been taken and concerns had been satisfactorily resolved. Also as previously stated, the SSAT walkdown of 70 valve installations did not reveal any discrepancy in the as-built valve configurations or locations, and any interferences with other equipment or any accessability or other conditions that might be related to the allegation.

In regard to sand blasting of valves, the issue originated from coating failures of several valves caused by the lack of proper coating curing time. Although some valve coatings were acceptable, 35 valves had to have the coatings removed and reworked at the plant site. For this later instance, nonconformance reports were written and were dispositioned to require sandblasting for removal of the unacceptable coatings. The moving parts of the valves were required to be protected according to the repair instructions. The SSAT determined that NRC Region IV Inspection Report 87-40 documents that an inspection had been previously conducted on this item and similar conclusions were drawn to the satisfactory conduct of this evolution.

5.2.2.3 Conclusion

The SSAT determined that the allegations were not substantiated except for the valve coating concern that was substantiated in part. The SSAT found that proper controls were found to exist and were implemented for the disassembly, maintenance, and reinstallation of valves. Although a nonconforming condition had existed insofar as the vendor coating of some valves, the SSAT found the condition was properly documented and that adequate corrective action had been taken.

5.2.2.4 Action Required

None

5.2.3 Radiation Effects on Control Valve Hose

5.2.3.1 Characterization of Allegation

It is alleged that the rubber hose attached to control valve CV-0381A will degrade if it is exposed to radiation.

5.2.3.2 Details

The SSAT determined that this concern had been previously brought to the attention of the HL&P SAFETEAM and independently addressed by inspectors from NRC Region IV. The SSAT reviewed the records applicable to this item and determined that the rubber hose in question has a protective braid which is designed to withstand radiation exposure up to 50 rads per hour. Equipment specification G-95285 that covers control valve CV-0381A requires that valves and all of their components be capable of withstanding radiation exposures of 50 rads per hour.

Valve CV-0381A is located in room 31, elevation 10 feet of the Unit 1 mechanical and electrical auxiliary building (MEAB). This area of the MEAB is considered to be a high radiation area that has exposure rates greater than 100 millirads per hour. However, the estimated exposure rate in room 31 is 1.9 rads per hour. This exposure rate was determined from Bechtel calculation NC5028, Revision 0. The valve and its components have been designed to accommodate 50 rads per hour and the actual expected exposure in the valve location is 1.9 rads per hour.

5.2.3.3 Conclusion

The SSAT determined that this allegation was not substantiated. The SSAT concludes that the rubber hose attached to the valve will not be affected by radiation exposure.

5.2.3.4 Action Required

None

5.2.4 Valve Extension Interferences

5.2.4.1 Characterization of Allegation

It is alleged that manual remote operators for valves 1/CV-0254A and 1-CV-0092/TCV-03814 are in contact with an electrical conduit and a pipe support, respectively. No nonconformance reports were written to document these interferences and no corrective action was taken.

5.2.4.2 Details

The SSAT reviewed the design control documentation referencing the correction of the interference conditions for these valves. The design changes were completed under field change request (FCR) BP-02542 and drawing 8373D94 for valve 1/CV-0254A and FCR DP-07266 and drawing 4M369PCV217 for valve 1/CV-0092/TCV-03814. The SSAT performed a field walkdown and a limited inspection of the as-built configuration of the subject valves to verify items such as adequate clearances between components and the manual remote operators, utilization of correct hardware, valve location and orientation, heat numbers, and material traceability. These items were all found to be acceptable. The SSAT also noted that the manual remote operators for the subject valves were classified as non-safety-related Class 9 components per the supplier bill of materials and HL&P specification L639T50507. In addition, all engineering and QC installation inspection records were reviewed and found to be acceptable. It was also determined that no NCRs were written to document those interferences because the installation was considered to be in process and non-safety-related.

The SSAT also reviewed two NRC Region IV Inspection Reports, 50-498/87-07; 50-499/87-07 dated June 3, 1987 and 50-498-30; 50-499/87-30 dated October 6, 1987, in which this concern had previously been evaluated. The reports indicated that these items were identified by HL&P on the Master Completion List (MCL) before the time the alleger identified the problem during a tour of the plant on October 7, 1986. HL&P's SAFETEAM documentation under an HL&P memorandum dated September 25, 1987 also evaluated this issue. The SSAT found that the rework that corrected the interference problems was not done until after the alleger's tour of the plant. During the field walkdown, the SSAT also inspected several other valves installed in safety-related systems for the following alleged discrepancies: interferences between remote valve operators and other components, excessive remote valve extensions, valve inaccessability, and reversed valve installation. No discrepancies were noted.

5.2.4.3 Conclusion

The SSAT determined that the allegation was substantiated in part because the interferences had existed between the manual remote operators on the subject valves and other components. However, these interferences were identified and documented, and the appropriate corrective action was taken.

5.2.4.4 Action Required

None

5.3 Heating, Ventilation, and Air Conditioning

5.3.1 Installation Cookbook

5.3.1.1 Characterization of Allegation

It is alleged that the "cookbook"* was confusing and difficult to interpret and it was subject to extensive revisions. The cookbook was supposed to have universal application with respect to heating, ventilation, and air conditioning (HVAC) hangers and supports. In theory, a craftsperson in the field could take the pieces prepared in the shop for a given hanger or support and, using the cookbook, could readily determine how to assemble and install a hanger or support at any specified location. The cookbook was supposed to provide all requisite information, including hanger or support configuration, assembly and weld details, and installation details to cover all possible field conditions.

There are concerns that (1) HVAC duct hangers and supports may not be adequate because the cookbook was misinterpreted for any given application and (2) that the revisions to the cookbook may have caused existing hangers and supports to be in nonconformance with current criteria even though the hangers or supports might have originally been installed correctly.

The SSAT interviewed one alleger who had expressed concerns regarding use of the cookbook. This alleger was unable to identify any specific examples of how and where use of the cookbook resulted in unacceptable installations of HVAC hangers and supports. In addition, it was not clear whether the alleger was relating first-hand experience, or passing on second-hand information. SSAT review of GAP files was equally unproductive with respect to identifying specific examples of unacceptable HVAC hangers and supports resulting from use of the cookbook.

5.3.1.2 Details

The SSAT determined that use of the cookbook in the field as the basis for installing HVAC hangers and supports ended sometime in 1983. The fact that the cookbook was no longer in use was an indication to the SSAT that the allegation might be substantiated, at least in part. To further pursue this possibility, the SSAT requested that HL&P assemble a complete package that detailed when use of the cookbook was stopped, how much HVAC duct work had been installed at the time its use was stopped, and what effect the use of the cookbook had on the adequacy of HVAC hangers and supports for their intended purpose.

HL&P provided copies of the appropriate sections of "Specification for the Installation of Safety Class and Nonsafety Class HVAC Equipment and Ductwork for the Houston Lighting and Power Company South Texas Electric Generating Station 5V279VS1003" (referred to hereinafter as the specifications). The data provided by HL&P include Revision 0, Addendum 1; Revision 1; and Revision 2 of the appropriate sections of the specifications. HL&P also provided specification change notices (SCNs) F-3, 6, and 9. The SSAT reviewed the data provided and made the following observations. In Revision 0 of the specifications dated

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*"HVAC Supports Design Manual."

December 28, 1982, paragraph 5.2.1.3 reads, in part, that "all HVAC supports shall be erected in accordance with HVAC Supports Design Manual (the Cookbook)...." Addendum 1 to the specifications, dated June 29, 1983, changed paragraph 5.2.1.3 to read, in part, that "all HVAC supports and flanged members shall be erected in accordance with duct fabricator's drawings reviewed and released by Bechtel or in accordance with Manual of HVAC Ducts and Duct Supports...." SCN 9, dated January 28, 1984, further revises paragraph 5.2.1.3 of the specificaions to read "HVAC duct supports shall be installed and inspected in accordance with duct support detail drawings (cut sheets) prepared by the duct fabricator and accepted by Bechtel Site Engineering." In summary, the data provided by HL&P documents the evolution from primary reliance on the cookbook to elimination of the cookbook as a field guide for installation of HVAC ducts and duct supports. This evolution occurred in just over one year (December 1982 to January 1984). Since January 1984, all HVAC ducts and duct supports have been erected using cut sheets which show all installation details and which leave nothing to be interpreted by field personnel.

HL&P also provided computer printouts that listed the completion dates for HVAC duct installations at STP. For the period from December 1982 to January 1984, very little HVAC duct was installed in Unit 1 and none was installed in Unit 2. Before December 1982, the major HVAC activity at STP was removal of duct and supports installed by Brown and Root. In summary, the SSAT determined that only a small percentage of the HVAC duct supports in Unit 1 were installed using the cookbook.

The last data package provided by HL&P included a selection of inspection packages covering inspections of HVAC installations by Ebasco QC. These reports covered both early duct installations and early inspections. Although a number of the packages reviewed included rework requirements for the item inspected, the SSAT determined that all inspection packages indicated that inspection of the HVAC installation was done in accordance with cut sheets and not the cookbook.

5.3.1.3 Conclusion

The SSAT determined that:

(1) The allegation regarding the cookbook was partially substantiated to the extent that it was confusing. This determination is based on discussions with NRC resident inspectors, discussions with HL&P personnel, actions taken by HL&P/Bechtel to eliminate field use of the cookbook, and the SSAT's independent assessment. The portion of the allegation that addresses the possibility that use of the cookbook resulted in unacceptable installations could not be substantiated. The documentation reviewed by the SSAT shows that some HVAC duct supports did require rework, but the root cause of the defects could not be determined; i.e., it could not be shown that misinterpretation of the cookbook was the cause.

(2) Only a limited amount of HVAC duct supports in Unit 1 was installed using the cookbook for guidance. The majority of HVAC duct supports were installed in accordance with cut sheets. All HVAC duct supports in Unit 2 were, or will be installed in accordance with cut sheets. All QC inspections in Units 1 and 2 were, or will be done, using cut sheets.

In summary, the SSAT concludes that the HVAC ducts supports for STP Units 1 and 2 were installed in accordance with design.

5.3.1.4 Action Required

None

5.3.2 Miscellaneous HVAC Allegations

5.3.2.1 Characterization of Allegation

It is alleged, in general, there were problems with:

(1) Ductwork and welds not cleaned before they were painted.

(2) HVAC material stolen, the heat number removed from the material, and a new heat number inscribed by the person(s) stealing the material.

(3) Separation of HVAC ducts from piping, hangers, conduits, and embedments for seismic considerations.

(4) Caulking used to seal HVAC plenums.

(5) HVAC damper in the emergency diesel generator (EDG) building for Unit 2 found to be defective, and the corresponding damper in the EDG building for Unit 1 had not been tested.

(6) Ductwork in EDG building signed off as complete by QC when, in fact, it was not complete.

Each of these six allegations was initially reviewed at the GAP offices before the SSAT inspection was conducted at STP. The SSAT was unable to obtain any specific data from the alleger files maintained by GAP, and none of the individuals associated with these allegations was made available to the SSAT for interviews.

5.3.2.2 Details

Because specificity was lacking, the SSAT performed a broad, general inspection in the HVAC area of Units 1 and 2 in order to assess the above concerns raised by the allegers.

(1) The alleger is concerned that ductwork and welds were not cleaned before they were painted. The SSAT's understanding of this allegation is that the welds were not cleaned to remove slag, and inspected before painting. The SSAT inspected numerous welds at random locations throughout both Units at STP and were unable to identify any unacceptable welds. Unacceptable conditions such as porosity, undercut, or inadequate weld size can be identified even if the weld has been painted.

(2) The SSAT understanding of the alleger's concern is that HVAC material was stolen, the heat number was removed from the material, and new heat number was inscribed by the person(s) stealing the material. No further details were made available to the SSAT. In the absence of specific locations, the SSAT was unable to identify the concern of this individual. As a result, the SSAT review HL&P's fabrication and installation process for HVAC material and it was determined that in certain cases HVAC material is fabricated and issued for a specific purpose, location, and application. Therefore, if a portion of ductwork, or its structural support steel is lost or stolen, it could not be substituted in the field for the reasons

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stated above. The SSAT also determined that in all safety-related applications there was QC involvement to not only verify that the correct identification numbers were present but that the correct material was utilized, proper installation was performed (i.e., material fitup), and that the compatible filler weld material was used. In addition, the SSAT performed field walkdowns and documentation reviews and did not identify any abnormalities with HVAC welds, sheet metal materials or fabrication, and its structural support steel.

(3) This allegation addressed the separation of HVAC ducts from piping, hangers, conduits, and embedments for seismic considerations. One allegation states that HVAC ducts could be less than the required distances from piping, hangers, etc. The other allegation states that compliance to seismic tolerances is indeterminate. There were no specifics about systems, locations, and tolerances violated, or time frame during which these situations existed. The allegers were not made available to be interviewed by the SSAT in order to obtain specific data. However, SSAT conducted several field walkdowns during which no instances were identified where ducts were routed in such a manner that other equipment would interfere with them during a seismic event.

(4) This allegation concerned caulking used to seal HVAC plenums. The alleger asserted that the caulking used could not withstand the plenum pressure which resulted in leaks. The SSAT has reviewed the alleger's file at the GAP office and concluded that the plenums are located in the STP fuel handling building. Beyond that, no specifics are given, and the alleger was not made available for interview by the SSAT. However, the SSAT determined that all HVAC systems for STP Unit 1 have been successfully tested for proper operation, and any system leaks that may have occurred have been corrected.

While the SSAT was at STP, an issue pertaining to HVAC duct gasketing material was raised at Comanche Peak. This gasket material, TREMCO 440A, was found to be highly flammable. The same material is used extensively at STP. A separate NRC inspection will be conducted at STP to address this issue.

(5) This allegation concerned an HVAC damper in the emergency diesel generator (EDG) building for Unit 2 that was found to be defective; allegedly the corresponding damper in the Unit 1 EDG building had not been tested. The SSAT was unable to determine the damper identification and the alleger was not made available for interview by the SSAT. However, the SSAT determined that all Unit 1 HVAC systems, including those in the EDG building, have been tested for proper operation and found to be acceptable. The SSAT determined that system testing includes proper operation of all dampers, including the damper of concern to the alleger.

(6) This allegation addressed ductwork in the EDG building which was signed off as complete by QC when in fact, it was not complete. The alleger files reviewed by the SSAT did not contain any specific safety concerns regarding the above ductwork, and the alleger was not made available for interview by the SSAT. As a result, the SSAT performed a field walkdown of all Unit 1 EDG building HVAC ductwork to determine if in fact all HVAC

installation was complete. The SSAT then reviewed the applicable installation records (i.e., traveler packages and weld records) and no deficiencies were noted. Also, the SSAT conducted interviews with qualified operations personnel and further reviewed the doucmentation and determined that all Unit 1 HVAC systems, including those in the EDG building, have been completed and tested through startup testing, and no deficiencies were identified during the inspection.

5.3.2.3 Conclusion

On the basis of the results of field inspections, the SSAT determined that allegations 1, 2, and 3 were not substantiated. However, the wrongdoing aspects of allegation 2 have been referred to NRC OI for further review.

Considering the lack of specific information, and considering that all Unit 1 HVAC systems have been successfully tested, the SSAT concludes that allegation 4 was not substantiated.

Allegation 5 concerning a defective HVAC damper in the EDG building for Unit 2 was not substantiated because no specific information was supplied. With regard to the concern that the corresponding damper in the Unit 1 EDG building has not been tested, the SSAT concludes that the damper of concern to the alleger has been tested. Thus, this part of the allegation was also not substantiated.

Considering the results of field inspections and the system testing performed, the SSAT concludes that the safety-related aspects of allegation 6 were not substantiated. However, the SSAT classified the allegation as wrongdoing and referred it to the NRC OI for further review.

With regard to the flammability problem concerning HVAC duct gasketing material, the NRC staff determined that TREMCO 440A material is suitable for the intended application at STP. The results of the NRC staff evaluation will be documented in a forthcoming report.

5.3.2.4 Action Required

None

5.4 Fasteners

5.4.1 Hilti Bolts

5.4.1.1 Characterization of Allegation

It is alleged that Hilti-Kwik concrete expansion anchor bolts were not installed according to site procedures. An interview was conducted with the alleger who acknowledged that installation problems with the bolts had been corrected.

5.4.1.2 Details

The SSAT reviewed STP site procedures for the selection, installation, and inspection of concrete expansion anchors. Brown and Root (B&R) quality construction procedure CCP-23, "Installation of Safety Related Concrete Expansion Anchor Bolts," Revision 0, dated October 23, 1979, through Revision 2, dated September 16, 1987, required that a field request for engineering assistance (FREA) must be prepared whenever expansion anchor bolts are to be used in locations not specified by the engineering drawings. The procedure refers to the South Texas Project technical reference document 5A019SQ010, "Design, Installation, Testing and Inspection of Concrete Expansion Anchor Bolts." It states that the approved concrete expansion anchors to be used are Hilti-Kwik bolts purchased as safety-related material and they are the only type to be used for permanent safety-related installations. It further describes the inspection, verification, and surveillance and other aspects of construction procedure as related to installation of expansion anchors.

The SSAT reviewed the current training program used at STP for the instruction of workers in the installation and inspection of concrete expansion anchor bolts. Training procedure QCP-2.1, "Indoctrination, Training and Qualification of Quality Control Personnel to ANSI N45.2.6 and ASME Section III, Division 2 Requirements," Revision 0, was issued on March 25, 1982. The SSAT was informed by HL&P personnel that the training program has been implemented from the beginning of construction and the instruction was provided by the Hilti staff.

SSAT also reviewed procedure SSP-14, "Stud Anchor Installation and Inspected," Revision 0, dated October 25, 1985, through Revision 2, dated December 18, 1987.

SSAT reviewed QTIPS Module IV-4, "Installation and Inspection of Concrete Anchors," which was used as training material by Ebasco Construction, Inc. (Ebasco) personnel who conducted training classes on installation of concrete anchors. In addition, the SSAT reviewed two project quality assurance surveillance reports dated July 30, 1984, reporting over the period of July 23 through July 26, 1984; these describe the Hilti anchor drilling demonstrations performed by Ebasco. The reports indicate that drilling of concrete was supervised and was not performed in a random fashion.

The SSAT interviewed the alleger by telephone. He stated that around June 1985, he noticed Hilti bolts had been incorrectly installed by unqualified craftspeople. He also stated that the problems were later corrected.

5.4.1.3 Conclusion

The SSAT determined that the allegation was not substantiated. The SSAT determined that craftspeople had been appropriately trained to install the Hilti anchors and that the QA/QC Program ensured the adequacy of installation. The SSAT also determined that although the formal training program was introduced in 1979 by the issuance of procedure CCP-23, "Installation of Safety Related Concrete Expansion Anchor Bolts," the training of the craftspeople and quality control personnel was initiated at the beginning of construction.

5.4.1.4 Action Required

None

5.4.2 Threaded Fasteners

5.4.2.1 Characterization of Allegation

It is alleged that threaded fasteners were manufactured abroad and imported to the United States, and they were manufactured according to standards that might have been different from the ASTM and ASME applicable requirements. Two vendors were identified as supplying questionable fasteners: Lone Star Screw Company and Cardinal Industrial Products Corporation.

An interview conducted with two allegers indicated that the fasteners of suspicious origin might be found on either Units 1 or 2 high-pressure piping and equipment. The allegers did not provide more details regarding the location of questionable fasteners.

5.4.2.2 Details

The SSAT concentrated its review on three issues: (1) what was the effort initiated by Bechtel Energy Corporation (Bechtel) to verify the adequacy of fasteners procured by Brown and Root, Inc. (B&R) before Bechtel became the architect/engineer (A/E) in 1984, (2) what were the procurement procedures followed by the original A/E, B&R, and (3) what are the current procurement practices by the present A/E, Bechtel.

The allegations identified two suppliers, the Lone Star Screw Co., Inc., and the Cardinal Industrial Product Corporation as being delinquent in supplying questionable fasteners. These concerns were raised also by Bechtel, during the turnover review program and by the NRC staff inspections. The Bechtel program did not include threaded fasteners which were supplied with components of materials or equipment, nor threaded fasteners purchased by the Bechtel home office. It concentrated on the threaded fasteners purchased by the job site.

The results of this turnover review effort by Bechtel are summarized in a Bechtel report entitled "Program for the Verification of the Adequacy of Threaded Fasteners," dated September 13, 1984, Revision 2.

The program included: sample testing of pertinent attributes of those threaded fasteners needed for construction but having incomplete documentation; a review of documentation and generic concerns on threaded fasteners; engineering evaluations of potential concerns identified in the review of documentation; and a testing program to determine adequacy of fasteners (used or to be used) which had incomplete documentation and could not be corrected by the vendor. The program review of documentation identified seven concerns which required further clarification. These seven concerns involved three vendors, Lone Star Screw Company (Lone Star) among them. A generic nonconformance report (NCR) was generated to document the concerns with these vendors, the one against Lone Star being NCR BM-00134.

Lone Star provided the requested documentation which resolved all but nine line items listed on the generic NCR written to document missing test results on Lone Star purchase orders (P.O.s). The issue was that Lone Star could not find test results for P.O. 12035, items 40-47 (A-307 bolts), and proof load tests results for P.O. 14176, item 4 (A194-2H nuts). In order to verify adequacy of these items, samples were sent to Coffer Laboratories for testing. Since all items (40-47) of P.O. 12035 were of the same heat (207C388), only four samples needed to be tested. Out of these, item 40 was tested for hardness, and items 41, 42, and 47 for tensile strength. The SSAT reviewed Coffer Laboratories, Inc. test results: 2777-83, dated July 15, 1983; 2778-83, dated July 19, 1983; 2779-83, dated July 15, 1983; and 2780-83, dated July 19, 1983. These results provided the required information and indicated that the samples were tested satisfactorily and in accordance with the Coffer Laboratories 1983 QA Systems Manual, Revision 4, approved by Bechtel Power Corporation on June 15, 1983. The SSAT also reviewed Coffer Laboratories Test Report No. 2781-83, dated August 1, 1983, which states that six nuts were received for proof load testing in accordance with the specification ASTM-A194-82A grade 2H Heavy Hex and were found to be satisfactory after proof loading.

The SSAT reviewed a memorandum to B. R. McCullough dated July 26, 1983, which contained the final list of purchase order line items which had been determined to be acceptable for release to construction. The memorandum states that the remaining line items (40-47 of P.O. 12035 and 4 of P.O. 14176) which are currently being tested will be dispositioned by NCR BM-00134. Item 7 of Attachment 3 to NCR BM-00134 states that items 40-47 of P.O. 12035 are acceptable and item 9 states that item 4 of P.O. 14176 is acceptable. The SSAT was informed that during the time of the Bechtel investigation of field purchases there were some fasteners that had already been installed in the field. Since all of the P.O.s have been accounted for and all of the material had been found to be acceptable, the question of whether the item is in stock or on the equipment becomes moot.

Parallel to the investigation conducted by the field office of the adequacy of fasteners described above, Bechtel Engineering staff also reviewed the B&R records for fastener procurements. The SSAT determined that the outcome of this investigation was that all of the material provided by Lone Star was found to be acceptable with the exception of items 58, 59, and 62 of P.O. 35-1197-0343. These items required additional testing and records review.

Two NCRs were written against these items. NCR BP-C3364 states that the Lone Star test reports required the nuts to be ASME Code Section III, SA 194-74 Grade F6 Heavy Hex. However, "F" designation was nonexistent in the 1974 edition of the ASME Code. This matter was dispositioned because it was found that 1974 S-76 edition of the code added the designation "F" to distinguish the three different chemistries for grade 6 material. NCR BP-03765 states that a cone strip test of 108,750 lb is required. SSAT reviewed the disposition of this NCR and determined that the nuts were subjected to the required proof load tests and may be used "as is."

In conclusion, the SSAT determined that all Lone Star material was found to be acceptable and that there was no need to change any hardware.

The SSAT reviewed records pertinent to fasteners purchased from Cardinal. B&R purchases were made by the field office as well as by engineering. Bechtel's review determined that there was no record of any purchases by B&R of any fasteners from Cardinal.

In 1984, Bechtel representatives visited Cardinal's facilities to evaluate the impact on material shipped to STP as a result of NRC staff findings relative to deficiencies with materials supplied by Cardinal. Two questions were raised: namely, the hardness test utilized by Cardinal (Izod impact method rather than Charpy) and stress-relieving temperature being below the minimum required. The Bechtel trip report recommended that the above questions be subjected to an engineering evaluation.

SSAT examined NCR BC-00469 which contains resolution of all identified deficiencies with Cardinal materials procured for STP. Basically, the NRC stated that Cardinal did not provide justification for the heat treatment temperature used on the applicable Cardinal certified material test report (CMTR). The material in question was manufactured by Sumitomo Shoji Kaisha, Ltd., Japan, and the temperature range listed on the CMTR was lower than that specified by the ASTM specification for A 193-B7 (1040°F vs. 1100°F). Another problem identified was that Cardinal's customer certifications reports stated Charpy impact tests had been used, but other supporting documents obtained by Bechtel indicated Izod impact tests were utilized. In view of the uncertainties listed above, Bechtel decided to return most of the Cardinal material to the vendor (shipping notice 3678). Furthermore, Cardinal was requested to provide amended CMTRs for the material not returned, consisting of heat Nos. x 107E, 9723D, 9423E, 9814D, 8724B, and N630B after the required Charpy V-notch testing has been performed. SSAT examined NCR BC-00469 which signified acceptance and completion of the tests by QC and also the modified CMTRs from the Cardinal.

The SSAT interviewed two allegers to try to determine more specific information regarding the faulty fasteners. The allegers informed the SSAT that some suspect bolts have dual markings: one forged marking indicating the manufacturer and the other stamped with letter "C," indicating that they were supplied by Cardinal. The allegers provided the SSAT with several examples of fastener markings of suspicious origins. The allegers also stated that the fasteners of suspicious origin might be found on high-pressure piping and equipment on either of the two units of STP. The allegers did not provide the SSAT with any more details regarding the location of the questionable fasteners. The SSAT embarked on an inspection of bolts already installed in the field. During this effort, the SSAT inspected the following:

(1) Unit I - Fuel Handling Building (FHB)

  (a) high head safety injection pump (El.-29.0 ft)
  (b) check valve 1-SI-0002C (train C)
  (c) check valve 1-SI-0002B (train B)
  (d) motor-operated valve (MOV) 1-SI-MOV-0001B
  (e) high-head safety injection valve (pump discharge)

(2) Unit II

  (a) containment charging pump flange (discharge)
  (b) positive displacement charging pump (line CV2112-A-A1)
  (c) heat exchanger 3R191NAX1-01A
  (d) Pacific check valve (penetration room, El. 34.0 ft)
  (e) containment - chemical environment control letdown heat exchanger
  (f) component cooling low-pressure line (El. 57.0 ft) (serial No. 2312-3B)

(g) residual heat removal exchanger on component cooling water line train B (El. 42.0 ft)

During the inspection, fasteners stamped with a letter "C" were observed by the SSAT, but the forged markings specified by the alleger could not be found. The SSAT also inspected fasteners in field warehouse and found on them the markings from Cardinal. The SSAT determined that these fasteners were bought by Guyon Alloys from Cardinal. Records reviewed by the SSAT indicated that heat numbers and NCR BC-00469 identified these fasteners to be from the same P.O. as those that had been retested because the wrong hardness test was used and a lower stress-relieving temperature was specified. The SSAT did not observe any deficiency in documentation reviewed.

The SSAT determined that STP is currently embarked on a testing program of fasteners in response to NRC Bulletin 87-02. The results of the sampling and testing of fasteners used at the STP were being reviewed by the NRC staff at the time of the SSAT inspection. The results of the NRC staff review will be presented in a separate report.

5.4.2.3 Conclusion

The SSAT determined that the allegation was substantiated, but because of the actions taken, all questionable fasteners were identified and all deficiencies encountered were corrected.

5.4.2.4 Action Required

None

5.4.3 Fasteners in Switchgear

5.4.3.1 Characterization of Allegation

It is alleged that fasteners used in the cabinetry of Westinghouse switchgear were frequently removed and, ultimately, replaced with fasteners from an unidentified source and had not been approved by the vendor.

The SSAT interviewed the alleger by telephone. During the interview, the alleger was asked to specifically identify systems or components that were associated with the concerns. Also, the alleger was asked to identify any vendor or other specifications that may have been violated by using fasteners that the vendor did not supply. In each case, the alleger did not respond directly to the SSAT requests for specific information. Instead, the alleger agreed to "show" the SSAT his concerns.

5.4.3.2 Details

The SSAT invited the alleger to come to the STP site and "show" the SSAT his concerns regarding switchgear fasteners. The alleger came to the STP site and proceeded to "show" the SSAT the 13.8-kV, non-safety-related switchgear in the turbine building of Unit 2. The alleger identified a few missing fasteners along with a number of examples of poor maintenance. The alleger still did not state his concerns with respect to switchgear fasteners or any other aspect of the switchgear. When requested, the alleger was unable to locate the 4.16-kV safety-related switchgear or, consequently, to identify any safety concerns with safety-related switchgear.

Independent of the alleger, the SSAT inspected the 4.16-kV safety-related switchgear in Unit 1. The SSAT determined that the 4.16-kV safety-related switchgear was supplied by ITE-Gould, and not by Westinghouse. The SSAT did not identify any missing fasteners in this switchgear, but was unable to determine if the visible cabinetry fasteners were vendor supplied or not. Subsequently, the SSAT contacted Brown Boveri Electric (successor to ITE-Gould) and discussed fastener requirements with the following results. Brown Boveri uses SAE grade 5 fasteners (nuts and bolts) throughout its switchgear. However, the only place grade 5 bolts are actually required is for bolting of bus bars. Grade 5 bolts are used in other places because it is more convenient to stock only one type of bolt. However, the SSAT determined that the use of commercial grade bolts in the remainder of the switchgear in lieu of grade 5 bolts is acceptable.

The SSAT also determined that Westinghouse Electric did supply 480-V ac load centers and motor control centers. The SSAT contacted Westinghouse and again discussed the type of fasteners used in Westinghouse load centers and motor control centers. As with Brown Boveri, the SSAT determined that the use of commercial grade fasteners in the cabinetry of Westinghouse electrical equipment is acceptable.

After the SSAT's inspection, NRC Region IV personnel conducted a walkdown of Unit 1 and observed a variety of switchgear fasteners. The NRC regional staff found different types of fasteners.

5.4.3.3 Conclusions

The SSAT determined that this allegation was partially substantiated because different types of fasteners exist in the switchgear. However, the SSAT determined that the existing fasteners are of sufficient quality to ensure the integrity of the switchgear, load centers, and motor control centers at STP.

5.4.3.4 Action Required

None

5.5 Welding

5.5.1 Weld Rod

5.5.1.1 Characterization of Allegation

It is alleged that faulty weld rods were used in welding all over the site by all disciplines for approximately six months and that the flux on this weld rod was uneven, causing "finger nailing" and "toe nailing." These conditions relating to arc stability could cause porosity and poor quality welds.

The SSAT interviewed the alleger who provided additional information in support of this allegation as indicated below.

5.5.1.2 Details

The alleged faulty weld rod being referred to was type E6013 (AWS classification for high titania, potassium-coated covered mild steel welding electrodes used in the shielded metal arc welding process). This faulty material was alleged to have been used under welding procedure specification WP-167, and to have been utilized for approximately six months to a year, from mid 1985 to late 1986. The faulty welding electrodes were manufactured by Atomarc and used by HVAC and other discipline welders. In response to the SSAT requests for information about specific locations where the weld rod was used and where defective welds might be located, the alleger stated that it had been used in the fuel handling building (FHB), the mechanical auxiliary building (MEAB), the reactor containment building (RCB), the diesel generator building (DGB), and the turbine generator building (TGB), at all elevations. The reactor containment fan cooling system duct patch plates in the RCB were cited as specific locations where the faulty weld rod was used.

The SSAT reviewed documents relevant to the inspection of this allegation, including welding procedure specifications WP-167 and WP-5; weld rod purchase orders; standard site procedure SSP-30 entitled, "Weld Filler Metal Control"; Situation/Problem Investigation Report S-13, dated September 20, 1985; HL&P's SAFETEAM records of welding-related allegations; and a list of controlled welding material reference numbers. On the basis of results from the review of weld rod purchase orders, the list of controlled welding material reference numbers, and welding procedure specifications WP-167 and WP-5, the SSAT determined that type E6013 electrodes had neither been purchased nor required by the specifications. The electrode types required by WPS-167 are E6010 (high-cellulose, sodium-covered) and E6011 (high-cellulose, potassium-covered), and the higher strength E7018 (iron powder, low-hydrogen-covered) electrode was required by WP-5. The SSAT's review of the HL&P's SAFETEAM records and NRC Region IV inspection reports did not reveal any concerns with the E6010 or E6011 electrodes. However, several concerns had been expressed regarding type E7018 electrodes manufactured by Oerlikon Welding Industries. Since the situation/problem investigation report involving Oerlikon-supplied material fell within the time frame that the alleger stated faulty weld rod was used at the STP facility, and because E6013 electrodes appear to have never been used, the SSAT decided to investigate the use of the Oerlikon-supplied E7018 electrodes and to assess the safety significance of such use.

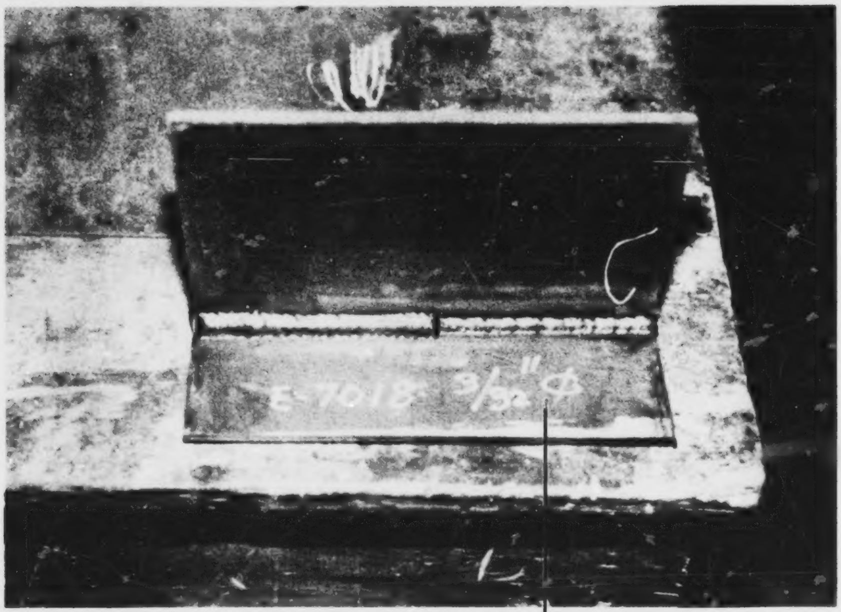
From the SSAT review of documentation concerning the Oerlikon E7018 welding material, Bechtel Energy Corporation was found to have conducted an extensive audit of the manufacturing facility of Oerlikon Welding Industries, Inc., a local supplier. After satisfactory results were obtained from the audit, Oerlikon was added to the approved vendors list. Bechtel subsequently issued P.O. 14926/BF4946 for 60,000 pounds of 3/32-inch-diameter type E7018 welding electrode. On July 12, 1985, Bechtel received a partial shipment of the electrodes and began issuing this material from lot 10450 for field use in early August 1985. HL&P's SAFETEAM documents show that complaints by STP site personnel of poor quality E7018 weld rod began after the early August 1985 date when the Oerlikon E7018 electrodes were issued.

Investigation of the complaints by Ebasco welding personnel determined that the flux coating on some of the Oerlikon E7018 electrodes was not uniformly deposited along the length of the weld wire and coatings were found cracked or broken. Since the flux coating provides shielding to prevent oxidation of the molten weld puddle, stabilizes the arc, and provides additives to produce the required material chemistry and mechanical properties, the irregularities discovered on the flux coating probably would have caused the conditions noted by the alleger.

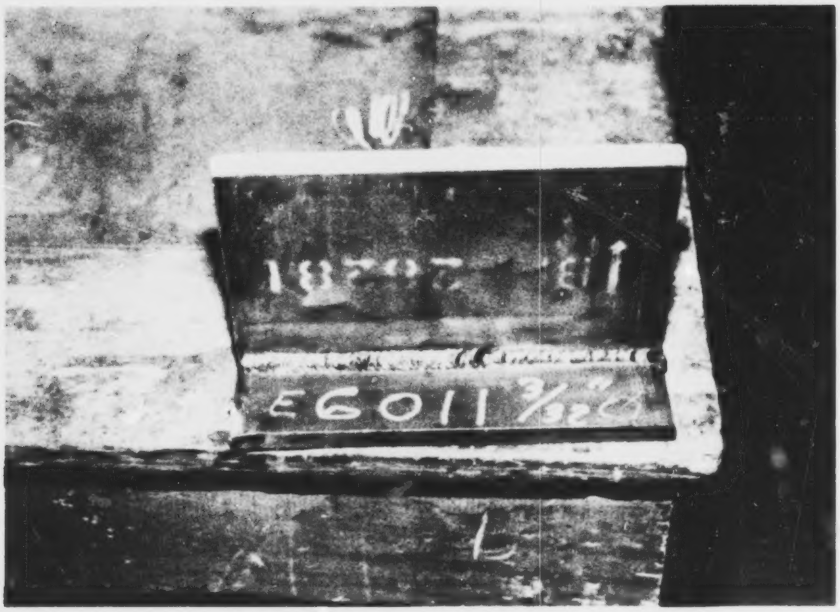
The SSAT determined that following additional inspections of the material by Bechtel, Ebasco, and an Oerlikon Welding Industries representative, it was agreed that the flux coating on a significant number of rods in lot No. 10450 was unacceptable, thereby warranting return of the lot to the manufacturer. Of the 20,000 pounds of weld material in the lot, approximately 19,000 pounds were returned to Oerlikon Welding Industries in late August or early September 1985.

In an effort to determine whether the E7018 electrodes in the unacceptable lot had been used in place of E6010 or E6011 electrodes for HVAC welding, the SSAT requested Ebasco to prepare weldments of the same material used in the HVAC system with two different type electrodes, E6011 and E7018. This was done to ascertain the typical bead characteristics of each electrode to aid in the HVAC weld inspections. The welds made with the E7018 electrode show a smoother surface profile than welds made with the E6011 rod (see Figure 5.5-1(a) and (b)).

The SSAT conducted an extensive visual inspection of numerous welds on ducts and supports in the HVAC system in the MEAB, RCB, DGB, FHB, and the space above the control room. Although most of the welds had been painted, thereby making it difficult to fully interpret each of the weldment characteristics, the visual inspections performed on the welds were sufficient to allow the SSAT to determine whether the welds were of good quality and appeared to meet design specifications and AWS Code requirements. In addition, 14 HVAC system support construction packages were reviewed by the SSAT for dates of final signoff and completeness and compared to the filler material issue record (FMIR) dates. Also, the SSAT reviewed the certifications of the welders who performed the welds on these supports. The SSAT determined that the documents were in order, the correct welding electrodes were issued, and the welders were qualified to weld to both applicable welding procedures, WP-167 and WP-5. The SSAT also determined that these weldments had been inspected and accepted by the QC organization.



(a) Fillet Weld Using E7018 Weld Rod



(b) Fillet Weld Using E6011 Weld Rod

Figure 5.5-1 Weldments Showing Typical Bead Characteristics of E7018 and E6011 Weld Rods

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5.5.1.3 Conclusion

The SSAT determined that this allegation was partially substantiated because a welding electrode problem had existed at STP in the time frame of concern. However, the welding electrode involved was E7018, not E6013, and the extent of the problem was not as widespread as the allegation indicated. The defective E7018 electrodes represented only a small percentage of the total filler material on site, and corrective action had been promptly implemented to preclude its widespread use and to identify and repair faulty welds if necessary. Furthermore, the SSAT did not find any evidence of faulty structural welds (where E7018 is used) during its inspection of STP.

5.5.1.4 Action Required

None

5.5.2 Weld/Welder Identification Traceability

5.5.2.1 Characterization of Allegation

It is alleged that welds were not stamped with the welder identification number at the time the weld was completed, but were stamped later by welders who had not performed the welding and that the procedure for identifying welders who performed welds does not allow for traceability.

The SSAT interviewed the alleger who provided additional information, as indicated below, in support of this allegation.

5.5.2.2 Details

The alleger identified the concern to be with the structural welding in the HVAC system. Specifically, the HVAC welding in the mechanical and electrical auxiliary building (MEAB) was supposed to have instances where completed welds did not have the proper welders' identification stamps affixed. If the construction traveler packages did not indicate that the welds had been accepted by QC, the welds were ground out and the structure rewelded. However, in some instances, welds were stamped with welders' identification stamps according to filler material issue records (FMIRs) used to document the withdrawal of weld rod from an issuing station. According to the alleger, welders' identification symbols were stamped on welds by matching the dates on the FMIRs to dates that welders worked in the areas of the unstamped welds. Thus, it was alleged that the right stamp was not necessarily placed on the right weld. The time period cited by the alleger was between late 1983 and 1986.

The SSAT found from the records of HL&P's SAFETEAM investigations that eight cases of alleged loss of weld/welder identification traceability had been documented during the time period cited by the allegers. The SSAT reviewed NRC Region IV Inspection Report 50-498/86-38 that documented the findings of investigations performed by the HL&P's SAFETEAM and found that problems with QC procedures for inspection of structural steel had existed in 1984. As noted in the inspection report, the QC procedures at that time required each QC inspector to perform two in-process inspections per day and all final inspections of completed work. However, because of the 30-to-1 craft-to-inspector ratio that existed, considerable delays in QC inspections may have also contributed to allowing the condition to take place and to the delay in the prompt identification of this situation.

Relevant to the allegations, the SSAT reviewed documents that are presently being used in the control of the welding program. These included (1) standard site procedure SSP-30 entitled, "Weld Filler Material Control"; (2) quality control procedure QCP-9.4 entitled, "Verification of Weld Filler Material Control"; and (3) quality control procedure QCP-9.5 entitled, "Weld Inspection (AWS)." The SSAT found these procedures to have adequate controls to alleviate the area of concern with welder traceability to completed welds and for the inspection of this and other attributes by the QC organization.

The SSAT performed a walkdown of the HVAC system in the areas where the concerns were identified to ascertain if the corrective actions taken to resolve the condition were adequately implemented. As part of this inspection, the

SSAT reviewed the associated drawings, FMIR, traveler packages, welder certifications, and stamps for HVAC welding on the ducts and supports for comparison with the field condition. The SSAT did not find any discrepancies that would indicate that a loss of weld/welder identification and traceability presently exists.

5.5.2.3 Conclusion

This allegation was partially substantiated because problems with QC procedures in 1984, as documented in NRC Region IV Inspection Report 50-498/86-38, established the possibility that some of the HVAC structural welds may have been marked with the wrong welders' stamps and, in that sense, the proper weld/welder identification may be lost. However, on the basis of the walkdown and review of documents related to the HVAC system performed by the SSAT, the loss of weld/welder identification was not evidenced. Since the welds are required to be inspected at a minimum by visual examination, assurance of their structural integrity was provided and documented. Wrong markings do not affect the structural integrity of welds. The SSAT concludes that this concern has been satisfactorily resolved.

5.5.2.4 Action Required

None

5.5.3 Welder Certification

5.5.3.1 Characterization of Allegation

It is alleged that welders were not certified in accordance with the applicable standards, and the process used by HL&P to renew welder qualifications is in violation of ASME and AWS requirements. Also, it is alleged that welder qualifications were renewed by reviewing the filler material issue records rather than by verifying that the welder had actually performed welds with the specific process. Furthermore, it is alleged that Intermech welders (welders who worked for the HVAC contractor) were not required to pass any welding tests.

5.5.3.2 Details

Since specific information pertaining to the actual welders involved was not available, the SSAT evaluated the welder performance qualification program. This was supplemented with a review of the deficiency reporting systems for evidence that the condition had been previously identified or that problems with weld quality were caused by inadequate welder qualification.

The SSAT reviewed NRC Region IV Inspection Report 50-498/87-07 which documented that a problem had existed relative to the failure to meet the requirements on welder performance qualifications procedures. This inspection report detailed the specific actions taken to correct the deficient conditions that were addressed in management corrective action requests (MCARs) 19 and 20. Based on these MCARs, the standard site procedures SSP-18 and SSP-30 were revised to better control the verification of welder qualification before the issuance of filler material and also before the actual start of the weldment. Additionally, the installation contractor, Ebasco Construction Inc., performed a surveillance of approximately 23,600 ASME welds to determine which welds were completed by qualified welders. Approximately 40 instances where welds were or could have been made by unqualified welders were noted and corrective action was taken. The SSAT determined that subsequent QA surveillances in this area show that this problem has been resolved.

Both ASME Code Section IX and AWS D1.1 require the requalification of a welder or welding operator if the individual has not used the specific welding process within the previous 3-month period. This may be extended to 6 months if the welder has been shown to have utilized another process during that period. The SSAT reviewed SSP-31, entitled "Welder Qualification," and found that these requirements had been included. In addition to the inspections that are required by other procedures to verify before the welding that the welders are qualified, SSP-31 provides the requirements for the completion and control of the welder certification status sheets. The evidence to ensure that the welder has performed the specific welding process within the required period, for evidence to support the continued qualification, is based on the in-process surveillance of the work at least once every 3 months or, alternatively, from the data on the filler material issue records at least twice every 3 months. Either of these methods is performed by the welding superintendent, who is required to compile and maintain the data.

With regard to the lack of qualification on the part of Intermech welders, the SSAT reviewed the contractual requirements imposed in this area and evidence that the commitments were being met. The SSAT found that the contract required that welding be performed to the requirements of AWS D1.1, "Structural Welding Code," and AWS D9.1, "Specification for Welding Sheet Metal," which provide specific information on the performance qualification testing and certification of welders. These requirements were incorporated into Intermech QC instruction QCI-STP-009, entitled "Welder Qualification," with references to quality field procedure QFP-9.001, entitled "Control of Welding Process." The compliance with the requirements was determined to be acceptable based on audits and surveillances in this area conducted by HL&P and Bechtel. The welder performance qualification tests were conducted and the records were maintained as required. The SSAT found no evidence of poor workmanship on HVAC welds that would serve as evidence of the lack of qualification of the Intermech welders.

The SSAT review of (1) procedures and certification documents that are presently utilized in the control of the welder performance qualification program, and (2) selected welder performance qualification (WPQ) records and status sheets found that the program is in accordance with ASME Code Section IX and AWS D1.1 requirements and is being adequately administered. Additionally, the visual inspections of the welding on the HVAC system did not support a finding that the welders were not adequately qualified.

5.5.3.3 Conclusion

The SSAT determined that the allegations were partially substantiated because documentation of problems with welder qualification had existed as identified in NRC Region IV Inspection Report 50-498/87-07 and STP management corrective action reports. However, corrective actions were initiated and implemented by Ebasco to correct the program deficiencies and perform surveillance inspections of welds. The SSAT found the present program for welder qualification and renewal to be satisfactory.

5.5.3.4 Action Required

None

5.5.4 Weld Rod Accountability

5.5.4.1. Characterization of Allegation

It was alleged that weld rod was not accounted for as required by code and by the Quality Assurance organization and that welders would get rod from other welders.

5.5.4.2 Details

Since specific information was not available, the SSAT reviewed the program and documentation utilized at STP for the control of weld filler materials. In addition, the SSAT reviewed previous indications for whether a problem had existed in this area and if the corrective actions taken were adequate; the SSAT did this by evaluating NRC inspection reports and HL&P's SAFETEAM records.

The SSAT reviewed standard site procedure SSP-30, Revision 1, entitled "Weld Filler Material Control." This procedure applied to all welding filler material controlled and issued by Ebasco Construction, Inc., and delineates the methods and responsibilities for the proper storage, distribution, return, and disposal of these materials. This procedure also provides the responsibilities and inspection requirements to ensure that the system is being properly implemented. The documents reviewed were found to be acceptable and were in accordance with ASME and AWS code requirements as specified by the QA Program.

The SSAT reviewed the NRC inspection effort related to the evaluation of the welding program at STP from the period of January 1983 to the present. During this review, the SSAT found several allegations that were described in NRC Inspection Report 50-498/86-38 and 50-498/87-07 documenting problems related to inaccurate information on the filler material issue records (FMIR) and the use of welding material on other than the assigned jobs. Although the problem with the FMIRs was found to be substantiated, it involved improper approval authority rather than the usage of incorrect filler material in the specified weldments or on other weldments. In the evaluation of the issue of filler material being used on other than the assigned job, the HL&P's SAFETEAM could not determine that the problem had occurred but concluded that the potential could exist. Adequate corrective action was taken with the FMIRs by restricting the review and approval authority to fewer individuals and by providing closer QC review of the issuance of filler material until the program was found to be properly functioning.

In the area of weld rod being used on other than the assigned jobs, the SSAT reviewed the HL&P assessment and found that the FMIRs, although used to document the withdrawal of filler material from an issuing station, are not the primary records to verify and document that the correct weld rod was used in a particular joint. The primary record for this purpose was the process data checklists for ASME welding or the structural welding inspection report. These records list, as required, the weld rod type and heat number, the weld procedure, the welder identification, and the QC personnel who observed the appropriate inspection attributes. Standard site procedures SSP-18, Revision 5, entitled "General ASME III Welding Requirements," and SSP-16, Revision 3, entitled "General Structural Welding Requirements," were found to adequately control the implementation of the requirements and prevent the use of incorrect filler material in a particular application. The SSAT reviewed the completed checklists and inspection reports for selected weldments and found the information to be satisfactory. Also, the inspection of actual weldments did not indicate that incorrect filler material types were used in the weldments.

5.5.4.3 Conclusion

The SSAT determined that the allegation was partially substantiated because documentation of the failure to properly implement procedures for completion of the FMIRs had existed. As determined by the previous NRC and SAFETEAM evaluations, it could not be substantiated that filler material was actually utilized in welds other than that specified on the FMIRs. The SSAT found that adequate corrective action was taken with the preparation of the FMIRs. The SSAT also found that the existing procedures and inspections were found to provide adequate assurance that the correct material types were used in the applications and the weldments were properly made.

5.5.4.4 Action Required

None

5.6 Electrical Cable, Conduit, and Instrumentation

5.6.1 Raychem Cable Splices

5.6.1.1 Characterization of Allegation

It is alleged that Raychem-type electrical cable splices were improperly installed and improperly inspected by Quality Control (QC) personnel. It is also alleged that incorrect hardware was used to install the splices. No particular component, system, structure, or location was identified by the allegers that could assist the SSAT to find the alleged problems.

5.6.1.2 Details

5.6.1.2.1 Onsite Inspection

The term "Raychem splice" refers to a sleeve manufactured by Raychem that is used to protect the splice (joint) between two electrical conductors. Raychem splice prototypes have been qualified in accordance with the requirements of Institute of Electrical and Electronics Engineers (IEEE) Standard 323 and proven to withstand specific hazardous environmental conditions caused by design-basis accidents such as loss-of-coolant accident (LOCA) or high-energy line break (HELB). A Raychem splice is considered a qualified splice only if it has been installed by trained individuals who utilize the manufacturer's recommendations and the appropriate hardware for the particular application.

Until January 20, 1987, Raychem splices used at STP were selected by field engineers, installed by craftsmen, and inspected by Quality Control inspectors. During the period of January 28-30, 1987, NRC staff performed an onsite inspection and observed that both ends of two low power control cables, in an electrical penetration assembly, were inadequately sealed. As a result of this finding, STP personnel reinspected all the Raychem splice installations and notified the NRC on February 19, 1987, pursuant to 10 CFR Part 50.55e, that several safety-related Raychem splices were installed incorrectly. The SSAT reviewed STP nonconformance report SE-5447 and deficiency evaluation reports 87-012 and 87-017 that documented the inspections performed to identify the improper installations and the corrective actions taken. The reinspection performed by STP personnel included all the cables installed before February 20, 1987. HL&P's inspections identified the following adverse conditions with Raychem splices:

(1) Some Raychem sleeves used were too large to envelope a splice. Consequently, when heated to shrink the sleeve, the sleeve did not make sufficient contact to seal the splice. If this condition remained uncorrected, the inadequate seal would expose the electrical splice to an adverse atmosphere.

(2) Splices were not properly shimmed. A shim is used when two cables with unequal diameters are spliced. The smaller cable is shimmed to build up its diameter to that of the larger cable. The entire joint is then covered with a Raychem sleeve of appropriate length and size and heat shrunk. If the smaller diameter cable is not shimmed, the sleeve will not effectively seal it.

(3) Raychem sleeves were not properly heated for the specified time duration causing an ineffective seal of the splice.

(4) Minimum bend radius (MBR) violations. MBR is the smallest radius to which a cable is permitted to be bent for a permanent installation. The cable manufacturer furnishes the MBR values (usually about 4 to 5 times the diameter of the cable). If a cable is bent below the MBR, permanent deformation may occur in the individual cable strands.

Between September and October 1987, STP QC inspections at the site identified more violations of MBR and an additional problem that was not previously considered relating to cable splice bolting hardware. In some situations, bolted connections are used to splice two conductors terminated with lugs. The problem occurs when the cable lugs are bolted together using a washer with a hole wider than the lug tang (tongue). The oversized washer hole does not allow the lug mating surfaces to make proper contact and as a result, it may create hot spots which could result in cable deterioration.

On October 1, 1987, stop work notice (SWN) F-02 was issued to Ebasco to stop Raychem installation activities after a surveillance identified that a Raychem installation in Unit 2 electrical penetration 36I did not meet a specified overlap requirement. The overall sleeve was required to overlap a shim by at least 1/4 inch. The SSAT determined that both the craftsman who installed the splice and the QC inspector who accepted this nonconforming condition had received and passed the previously established training requirements specified in standard site procedure SSP-55. "Corrective Action Reverification Record No. 071," dated November 4, 1987, documented the corrective actions taken for SWN F-02. In record 071, Ebasco committed to utilize authorized construction and QC personnel who had successfully completed the mandatory site retraining program and were recommended by their appropriate level of management.

The SSAT independently observed Raychem installation activities in progress at elevations 80 feet and 29 feet in the Unit 2 auxiliary building and determined the following:

(1) On the basis of the interviews conducted by the SSAT, the electricians and QC inspectors performing the work were knowledgeable about the installation requirements.

(2) The Raychem splicing kits being utilized matched the description specified by the field engineers.

(3) The Raychem kits were identified by lot number which could be traced to their procurement.

(4) Of the two installations chosen for examination (one was a parallel splice of a 14 AWG size conductor to a 18 AWG size conductor with a shim and the other was a butt splice with no shims required), both were found to be prepared in accordance with the applicable instructions and were found acceptable by the SSAT.

(5) Micrometers used to measure the diameter of the cable conductors had current calibration status.

(6) The termination inspection record adequately documented the appropriate verifications by the QC inspector.

The SSAT also examined the splices on the inboard and outboard sides of electrical penetration EPA-17 on STP Unit 1 (see Figure 5.6-1(a) and (b)). Additionally, two terminal boxes in the Unit 1 reactor containment building were opened and the SSAT inspected the Raychem splices. The SSAT observed the following items and found them to be acceptable:

(1) The outer surfaces of the sleeves were smooth and glossy.

(2) Adhesive was visible at each end of the adhesive-coated parts on each splice.

(3) Where shims were used, the outer sleeves overlapped the shims.

(4) No splitting, blistering, or cracking of the outer shrink sleeve was observed.

No adverse findings were identified by the SSAT. Following the visual inspections, the SSAT examined the inspection records for the EPA-17 splices. The inspection record for one cable splice could not be located. STP staff subsequently determined that this cable was not included in the reinspection program because Ebasco had not listed this cable as one having a Raychem splice.

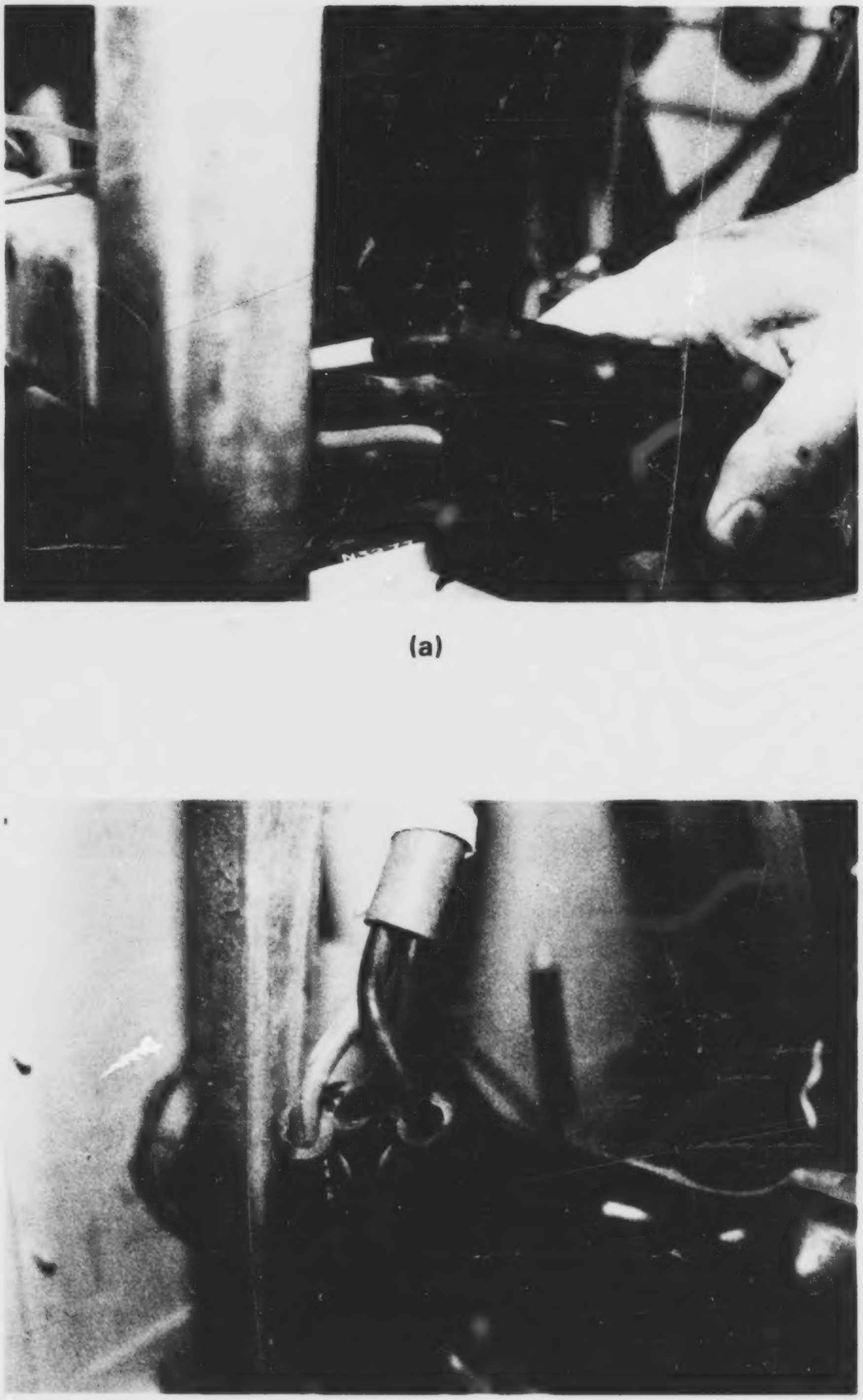
HL&P on its own initiative performed a complete reexamination of Raychem splices in Unit 1 to verify that problems similar to the unreinspected Raychem splice in electrical penetration EPA-17 do not exist in the plant. The results of this effort were recently reported to the NRC and are discussed in Section 5.6.1.2.2, which follows:

5.6.1.2.2 Subsequent Actions

Pursuant to 10 CFR Part 50.55e, HL&P notified the NRC on March 1, 1988 that six Raychem cable splices were installed incorrectly. Two members of the SSAT visited the STP facility between March 4 and March 8, 1988, to review the significance of these findings, determine the root cause, and assess the generic implications.

The SSAT determined that 91 (of approximately 2300) Raychem splices were identified as having been excluded from earlier reinspections performed by HL&P. As a result of a reinspection of the 91 splices, 3 were identified as needing rework and another 3 splices were identified as marginal. The SSAT determined that all 6 splices had been reworked by HL&P.

The SSAT found that HL&P's program for reinspection of Raychem splices involved obtaining a computer printout of installed cables, pulling the completion records of these cables, and manually sorting the records to determine what cables had Raychem splices installed and required reinspection. Records that did not include any reference to Raychem splices were classified "not applicable" (NA) and placed aside. All other records (that included reference to Raychem splices) were used to develop a reinspection list for Raychem splices. The reinspection list was also developed manually.



(a)

(b)

Figure 5.6-1 Raychem Splices

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During previous reinspections of Raychem splices in February and September 1987, the SSAT found that in the process of sorting the cable completion records for NA or reinspection status, splices were overlooked because their respective cable completion records had incorrectly been classified as NA. Also, the SSAT found that splices were omitted from the reinspection list during the transfer of data from the applicable cable completion records to the reinspection list. In addition, the SSAT determined that the September 1987 reinspection was based on a computer printout of cable completions since February 20, 1987. The SSAT found that the computer instructions utilized to sort out cables for this time period erroneously excluded cables that were found to have Raychem splices.

The SSAT review of HL&P program for reinspection of Raychem splices determined that the omission of 91 splices from previous reinspection lists was the result of human errors that were not disclosed because HL&P did not have an adequate verification/reconciliation program in effect.

The SSAT determined that the February 1988 reinspection of Raychem splices in Unit 1 involved obtaining a complete computer printout of all completed cables in Unit 1 and pulling the cable completion records for all printout entries. The cable completion records were again reviewed to determine which cables had Raychem splices, and the results of this review were compared with the earlier reinspection lists. As a result of this comparison, the 91 omitted splices were discovered. The SSAT determined that this last review by HL&P included a comprehensive verification/reconciliation effort to ensure that previous human errors were not repeated. The SSAT also determined that no special instructions were given to the computer, so there were no data omissions (as had occurred in the September 1987 reinspection computer printout). In summary, the SSAT determined that the corrective actions taken by HL&P during the February 1988 reinspection of Raychem cable splices were appropriate.

The SSAT reviewed several other corrective action efforts at Unit 1 of STP in which computer data bases were used in the identification and reconciliation of items suspected of being deficient. This review was performed in order to ascertain if the Raychem splice reinspection efforts were isolated cases in which corrective actions were not complete or if other efforts also had similar problems. The following issues were subjects of reinspection at STP that the SSAT reviewed:

- instrumentation installation inspections
- electrical panel internal cable separation (per Regulatory Guide 1.75)
- pipe support installations
- motor-operated valve inspections

The SSAT reviewed the circumstances that led to these reinspection efforts, the root cause determination, the corrective actions taken to reconcile any noted deficiencies, and the QA/QC inspection efforts associated with each case. In each case, a computer data base was used to generate lists of all possible deficient items and, in some instances, additional sources of input, such as design drawings, were also used to ensure that all affected items were identified and tracked through completion of the reinspections and any rework that might have resulted. The SSAT determined that the four reinspections reviewed were performed correctly and thoroughly to ensure that all items were reconciled through completion, including efforts by QA/QC to ensure the issues were

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were resolved correctly. However, the electrical panel internal cable separation reinspection effort needed some explanation. The SSAT determined that five panels were not included in the initial reinspection. These five panels were not included in the original computer data base used to identify all electrical panels that contained cables from multiple trains. The SSAT found that four of the panels were not in the data base at the time of the reinspection because the installation of the equipment in the panels was not completed or the panel equipment was being modified. The remaining panel had been modified, but the identifier in the data base signifying that it contained cables from multiple trains has not yet been updated. The above justifies acceptably why the five panels were not included in the initial reinspection.

The SSAT determined that subsequent to the electrical panel internal cable separation reinspection, each of five remaining panels had also been reinspected for adequate separation and they had been found acceptable.

In addition, the SSAT inspected one of the five panels which was not included in the initial reinspection to confirm the adequacy of the reinspection effort. The SSAT determined that the installation complies with the specified cable separation criteria for multiple train cables.

5.6.1.3 Conclusion

The SSAT determined that this allegation was substantiated. Three improperly installed Raychem splices were found and replaced by HL&P while investigating this allegation. Three other splices were determined to be of marginal quality and were reworked.

HL&P also discovered that 91 splices had failed to be reinspected during HL&P's corrective reinspections for splices. The SSAT has inspected these corrective action programs in detail to determine the cause for these omissions. The SSAT concludes that they were caused by personnel errors in the use of the computer tracking system for electrical components and by errors (during manual entries) made in transferring data between tracking systems. On the basis of the SSAT's review of corrective action programs used by HL&P for other reinspections in the electrical as well as in other construction disciplines, the SSAT concludes that these omissions are unique to the Raychem splices reinspection and are not generic to other corrective action efforts at STP.

5.6.1.4 Actions Required

The SSAT has reviewed HL&P's findings related to the reinspection of Raychem splices. The failure to include all splices in the previous reinspection program indicates the need to revise the existing procedures to ensure that future corrective action initiatives involving all construction disciplines are complete and accurate. The corrective action program procedures involving all construction disciplines need to be modified to include verification of the input information used to ensure its completeness and correctness. The procedures should also require documentation of completed reconciliation of all items identified as potentially and actually being deficient, and their verification should be included in corrective action procedures and processes.

Before ascension from 5% power for Unit 1, HL&P shall complete all modifications concerning the corrective action program implementing procedures in accordance with the above discussion.

Before loading fuel into Unit 2, HL&P shall complete a reexamination of Raychem cable splices using the revised corrective action program implementing procedures and perform all corrective hardware and software actions found to be necessary.

5.6.2 Reactor Coolant System Instrumentation

5.6.2.1 Characterization of Allegation

It is alleged that the valves in the instrument sensing lines on the section of the reactor coolant system loop between the steam generators (SGs) and reactor coolant pumps (RCPs) should have a double valve configuration instead of the installed single valve configuration.

5.6.2.2 Details

The SSAT reviewed the piping and instrumentation diagram provided in the Final Safety Analysis Report (FSAR) and the corresponding installation drawings for the reactor coolant flow transmitters. The SSAT walkdown verified that the installation was in accordance with the FSAR and drawings. Additionally, the SSAT determined that the nuclear steam supply system (NSSS) supplier, Westinghouse, specified that only one root valve was necessary, and that this installation was consistent with ASME Code Section III requirements.

5.6.2.3 Conclusion

The SSAT determined that this allegation was not substantiated. The SSAT concludes that the configuration of the reactor coolant flow transmitter sensing lines met the ASME and Westinghouse requirements.

5.6.2.4 Action Required

None

5.6.3 Incore Instrumentation Guide Tubes

5.6.3.1 Characterization of Allegation

It is alleged that, during construction activities in the Unit 1 reactor containment building, weld splatter fell on the incore instrument guide tubes connecting the stubs under the reactor pressure vessel (RPV) and the seal water table and nonconformance reports were not written to document this problem.

5.6.3.2 Details

To ascertain the as-built condition of the incore instrumentation guide tubes, the SSAT visually inspected the tubes connecting the stubs under the Unit 1 RPV and the seal water table. The SSAT observed no weld splatter on these lines (see Figures 5.6-2(a) and (b) and 5.6-3 (a) and (b)).

The SSAT determined that nonconformance reports are not required to document installation deficiencies identified in-process before inspection. Thus, if the condition existed at that time, the condition could be corrected without such documentation being necessary.

5.6.3.3 Conclusion

The SSAT determined that this allegation was not substantiated because the as-built configuration and condition of the incore instrumentation guide tubes were acceptable.

5.6.3.4 Action Required

None

5.6.4 Flexible Conduit Bend Radius

5.6.4.1 Characterization of Allegation

It is alleged that flexible metallic conduit was bent to form a radius that was below the minimum bend radius (MBR) permitted in seven instances. The SSAT interviewed the alleger who indicated that the seven concerns had been brought to the attention of HL&P's SAFETEAM.

5.6.4.2 Details

Flexible metallic conduit (FMC) is utilized to enclose and protect electrical cables from damage (see Figures 5.6-3(a) and (b) through 5.6-5(a) and (b)). At STP, FMC with a diameter of 1 inch was generally used. MBR refers to the shortest radius to which an electrical cable may be bent to prevent injuring the cable. This is usually specified to be five times the actual cable diameter. When a cable is enclosed in FMC, the bend radius of the FMC should not be shorter than the MBR of the installed cable. Cables bent below their MBRs may cause permanent deformation of the conductors, e.g., some strands may break.

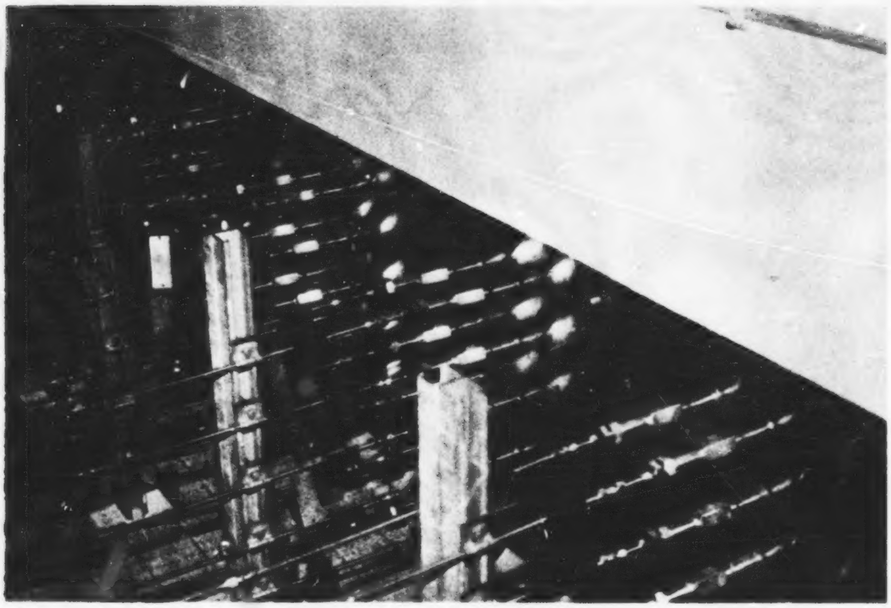
The SSAT understood that the alleger had identified to HL&P's SAFETEAM specific locations where the bending of FMC had violated the established MBR criteria. During the inspection, the SSAT compared information provided concerning these specified locations and to the documentation prepared by the HL&P's SAFETEAM. The SSAT determined that all concerns were documented with appropriate dispositions in the HL&P's SAFETEAM report dated October/November 1986. The following are the details of the concerns:

(1) At elevation 6 feet in room 103 of the reactor containment building (RCB), Unit 1, the bend radius of the 1-inch-diameter FMC with identification tag NIXC2BRS853 and running to junction box SC 3655 was 3 inches. The cable inside the flexible conduit had an MBR of 1.8 inch. Therefore, the installation was found acceptable.

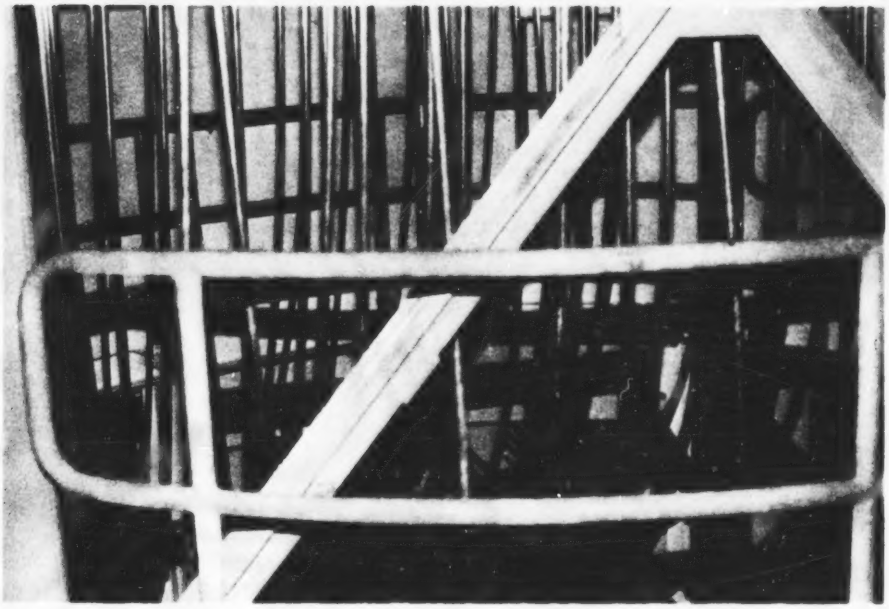
(2) At elevation 11 feet in RCB, Unit 1, the FMC identified as NIXCDBX286 had an installed bend radius of 1.5 inch. The allowed MBR of the enclosed cable was 1.1 inch. Therefore, the installation was found acceptable.

(3) At elevation 31 feet in the Unit 1 mechanical and electrical auxiliary building (MEAB), room 106A, the conduit leading to a Limitorque-type motor-operated valve was in a passageway and could be potentially damaged. This installation had been inspected and NCR CE05256, dated December 12, 1986, identified that the permanent identification tag was damaged and the flexible hose was broken. The tag was replaced and was verified to be acceptable on April 21, 1987. Design change notices (DCNs) 4 and 5 were initiated to rotate the valve actuator by 180° to remove it from the passageway. The valve is scheduled to be rotated during the first refueling outage.

(4) At elevation 10 feet in room 035 in the MEAB, Unit 1, the bend radius for an FMC on instrument DICB-TSH-00240 was found to be 4 inches. This condition was dispositioned and found acceptable, since the MBR of the cable within the conduit was 1.8 inch.



(a) Connections to the Seal Table



(b) Just Below Reactor Vessel

Figure 5.6-2 Incore Instrumentation Guide Tubes

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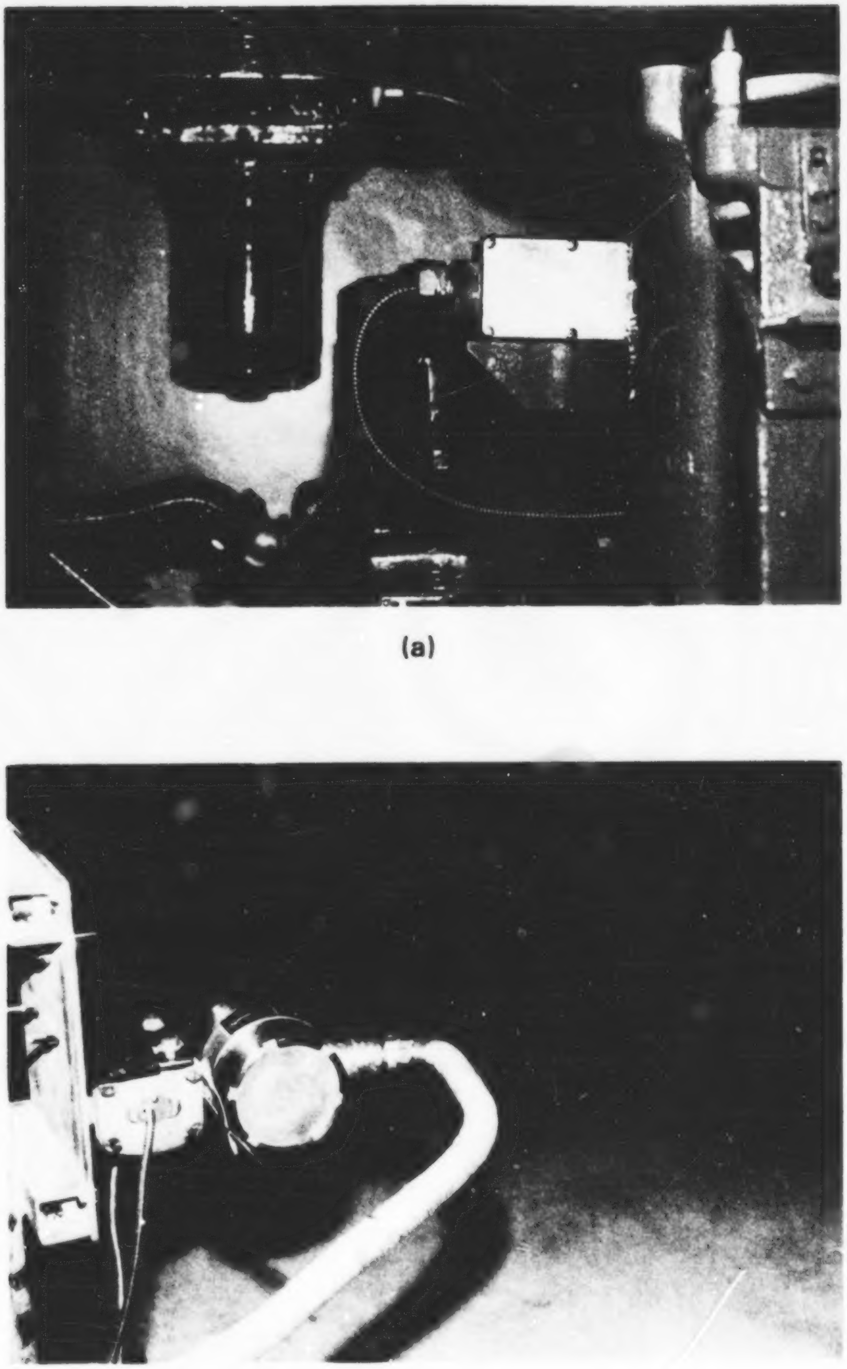

(a)

(b)

Figure 5.6-3 Flexible Conduit Installation Reviewed by SAFETEAM-Dispositioned Use As Is

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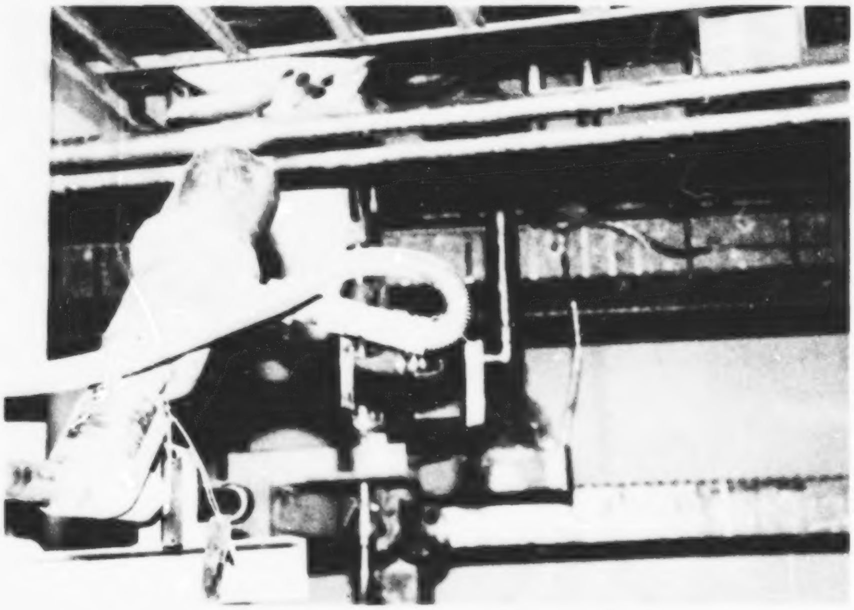
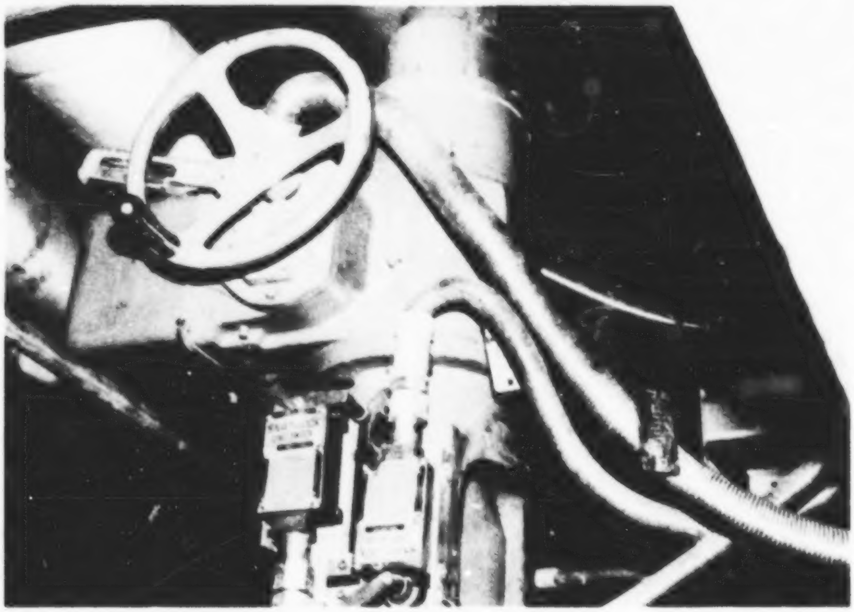


(a) Installation on Solenoid Valve - Cable Bend Radius Not Violated



(b) Installation to Limit Switch - Cable Bend Radius Not Violated

Figure 5.6-4 Flexible Conduit Installations With Apparent Bend Radius Violations

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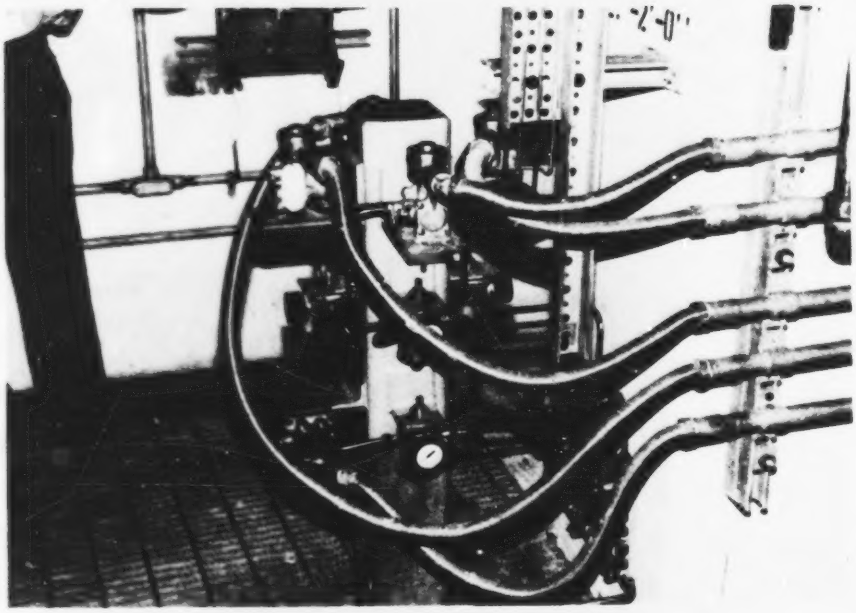
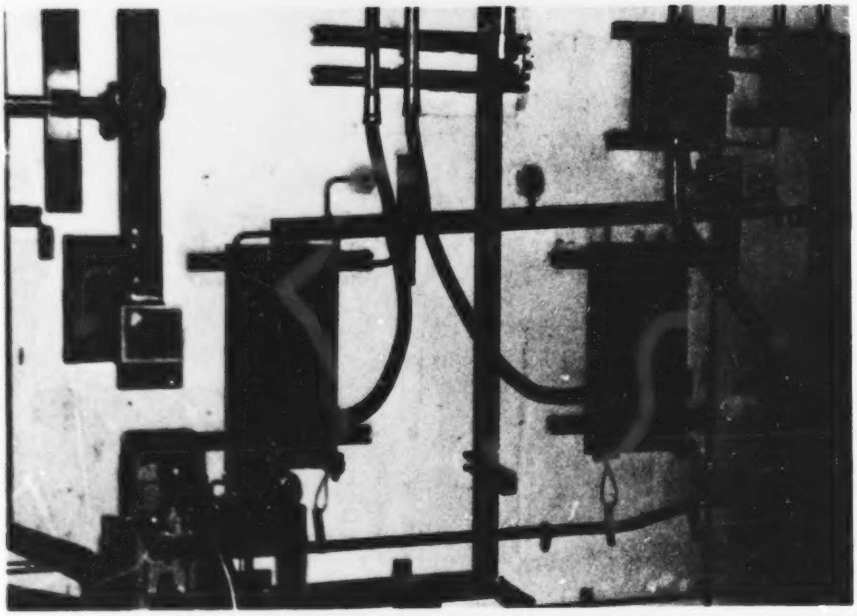


(a) Flexible Conduit to Solenoid Valves, Unit 1 Containment



(b) Flexible Conduit to Instrumentation, Unit 1 Containment

Figure 5.6-5 Typical Acceptable Flexible Conduit Installations

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(5) At elevation 10 feet in room 035 in the MEAB, Unit 1, the flexible conduit on instrument CICV-TSH-0023B was found to have a bend radius of 6 inches. The engineering disposition found this to be acceptable since the MBR of the cable was 1.8 inch.

(6) At elevation 19 feet in room 079B in the MEAB, Unit 1, the flexible conduit on limit switch NICV-2SC-0201, which is in a non-safety-related system, had a bend radius measured to be 1.25 inch. The engineering disposition found this unacceptable because this was less than the MBR of 1.8 inch specified for the cable. This item had been entered in the STP Master Completion List for corrective action.

(7) The flexible conduit to microswitch CV02 NICV-FCV-202 in room 079A at elevation 19 feet in the MEAB, Unit 1, was found to have a bend radius of 3 inches. The engineering disposition determined this to be acceptable since it was above the MBR of 1.8 inch for cable code C-N 312 within the conduit.

The SSAT walked down several elevations in the reactor containment building, Unit 1, to inspect the adequacy of bend radius of FMCs. The SSAT observed FMCs installations used to protect cable runs which were routed from rigid conduits or junction boxes to individual components.

The SSAT identified two connections that appeared to violate the MBR requirement. The bend radius of the conduits containing cables identified as A1SI03CISJ and B1SI22C1WA were measured to be 3 inches. The SSAT verified the diameters of these cables and determined that the MBRs of the cables were 1.8 inch and 2.3 inches, respectively. Therefore, the SSAT considered these installations satisfactory.

5.6.4.3 Conclusion

The SSAT determined that some of the allegations were substantiated because several MBR violations existed. However, HL&P's SAFETEAM had documented these concerns and corrective actions had been initiated or were properly scheduled for future correction.

5.6.4.4 Action Required

None

5.6.5 Electrical Cable Installation

5.6.5.1 Characterization of Allegation

It is alleged that a "come-a-long" was used in STP Units 1 and 2 to pull electrical cable through conduit and cable trays.

5.6.5.2 Details

A "come-a-long" is a device that utilizes a rachet-pulley mechanism to provide mechanical advantage to pull heavy objects for short distances. The "come-a-long" has to be attached to a rigid structure to provide adequate anchorage when used. The cable specifications at STP require that cable tension during cables pulls be calculated before installing a cable. A dynamometer or other suitable device is included in the pulling process to monitor the cable pull tension. If the pull tension were to be exceeded, the cable jacket may shear and leave the cable with bare conductors which could be noticeable. Also, if the tension exerted on the conductors exceeds its yield strength limit, the pulling load would drop noticeably. This condition would also be detected when the (power) cables are subjected to high potential (Hi Pot) tests.

In the absence of specific information to locate the cables pulled using a come-a-long device, the SSAT verified that procedural installation requirements had been established. The SSAT reviewed the following documents to determine the requirements specified for pulling cables. Requirements were found in standard site procedure SSP-27, "Installation of Electrical Cable," and construction site procedure CSP-19, "Safety and Non-safety Related Cable Pulling." Procedure CSP-19 required the pull tension and the side wall pressure to be calculated and documented for the pulls. Also, the procedures required the cable installers to use a calibrated dynamometer to monitor the pull tension accurately during the installation. In addition, SSAT review of post-installation cable testing did not find evidence that the installed cables had failed testing requirements.

5.6.5.3 Conclusion

The SSAT determined that this allegation was not substantiated. The SSAT concludes that the use of a come-a-long device or power winch provided with a dynamometer is acceptable.

5.6.5.4 Action Required

None

5.6.6 Electrical Cable Separation

5.6.6.1 Charaterization of Allegation

It is alleged that cables were installed without adherence to the minimum separation criteria between safety-related (SR) and non-safety-related (NSR) cables. No specific details about the locations or components of alleged deficiencies were given to SSAT.

5.6.6.2 Details

The SSAT reviewed the established requirements for the identification and separation of cables described in standard site procedures SSP-27, "Installation of Electrical Cables," and SSP-28, "Installation and Inspection of Electrical Raceway and Supports." Additionally, these procedures were supplemented with further details in SSP-26 (E), "Termination of Electrical Cable"; SSP-27(E), "Installation of Electrical Cable"; SSP-28(E), "Raceway"; and construction site procedures CSP-8, "Cable Terminations and Splices"; CSP-19, "Safety and Non-Safety Related Cable Pulling"; and CSP-43, "Installation of Electrical Raceways and Hangers." The SSAT found these procedures satisfactory. Furthermore, the separation distances that are required to be maintained between color-coded raceways were found to be indicated on the installation drawings.

In the absence of specificity, the SSAT conducted a document search to ascertain whether similar problems in this area were previously identified by HL&P or NRC. The SSAT determined that an NRC inspection was conducted by a construction assessment team (CAT) between October 21 and November 22, 1985. Results of this inspection is documented in Inspection Report 50-498/85-21 and 50-499/85-19, which identified cables that were being installed without adequate separation. As a result of this finding, HL&P initiated an investigation to determine the extent of the problem and provide resolution. Corrective action report (CAR) 434 was generated to document all the activities required to resolve this problem. The SSAT reviewed CAR 434 and determined that inadequate cable separation occurred in areas where cables were routed in the transition from raceways to equipment and termination cabinets. Cable separation violations occurred because the cables were not enclosed in metal conduit.

Walkdown inspections were performed by the HL&P QA organization to verify the implementation of cable separation requirements. In addition, HL&P conducted training courses for craftsmen, QC inspectors, and other individuals associated with this activity. The SSAT reviewed general surveillance reports SH-1025, SH-1050, SH-1067, SH-1118, SH-1149, SH-0946, and SH-2400 which document the results of HL&P QA walkdown inspections. Finally, the SSAT reviewed audit report G54-701, dated February 10, 1987, which verified among other things, that cable separation was now being properly maintained during the installation of electrical cable.

The SSAT also walked down several elevations in the Unit 1 reactor containment building, cable spreading room, and essential switchgear room in the auxiliary building, and observed no violations of the separation criteria.

5.6.6.3 Conclusion

The SSAT determined that the allegation was substantiated to the extent that electrical cable separation problems had existed at STP during 1984 and 1985. However, the SSAT determined that these problems have been corrected and subsequent inspections, surveillances, and audits indicated that cables have been installed with adequate separation.

5.6.6.4 Action Required

None

5.6.7 RCS Flow Transmitters

5.6.7.1 Characterization of Allegation

It is alleged that reactor coolant system (RCS) flow transmitters were removed after their installation had been inspected and approved.

The SSAT interviewed the alleger who provided additional information, as indicated below, in support of this allegation.

5.6.7.2 Details

The SSAT found from the alleger that during construction of STP, three of the transmitters used in the flow circuit of the RCS were removed to allow other equipment to be installed. The alleger stated that the instruments and their associated hardware had been installed and inspected and were considered "ASME documented" installations. When it asked what had become of the removed transmitter assemblies, the SSAT learned that in all cases the alleger stated that they were satisfactorily reinstalled and reinspected.

The alleger was concerned that once a piece of equipment was installed, it should remain in place and not be disturbed. However, during construction of a facility as large and as complex as a nuclear power plant, it is sometimes necessary to remove equipment to facilitate installation, removal, or repair of other items. As for the matter of allowing such activities, it is most likely to be a matter of convenience or inconvenience to have to perform the same activity more than once. What is essential is that the system, component, or structure is installed correctly and functions properly before plant startup.

5.6.7.3 Conclusion

The SSAT determined that this allegation was not substantiated. The SSAT determined that the RCS flow transmitter assemblies were installed, inspected, and tested satisfactorily.

5.6.7.4 Action Required

None

5.6.8 Radiation Protection for Liquid Waste Processing System Panel

5.6.8.1 Characterization of Allegation

It is alleged that pipes and instrument tubing connected to a liquid waste processing system (LWPS) panel might be cross-connected in such a manner that radioactive liquids could be introduced into the panel. The panel does not provide adequate radiation protection or shielding to prevent personnel from becoming contaminated.

The SSAT interviewed the alleger who clarified the concern as indicated below.

5.6.8.2 Details

The concern was that during repairs or maintenance the pipes and instrument tubing leading from pumps and other equipment in the LWPS could be cross-connected with lines containing radioactive substances. These radioactive substances would then be allowed to enter monitoring and control panels which are located outside a shielded room and were not designed to provide radiation shielding to workers using them.

The SSAT determined during a walkdown of the area involved that pipes, tubes, and other mechanical components are installed in such a manner that would not allow them to be cross-connected with lines containing radioactive substances.

5.6.8.3 Conclusion

The SSAT determined that this allegation was not substantiated.

5.6.8.4 Action Required

None

5.7 Civil/Structural

5.7.1 Cracks in the Fuel Handling Building (FHB)

5.7.1.1 Characterization of Allegation

It is alleged that there is a crack in the concrete basemat of the fuel handling building. The SSAT was given no other particulars about this allegation.

5.7.1.2 Details

Because of lack of specificity regarding the unit in which the alleged cracks were located, the SSAT reviewed 54 concrete pour records for the basemats of the fuel handling buildings (FHBs) for Units 1 and 2. From these 54 pours, 3 had unacceptable slump tests and 3 did not have the required air and temperature measurements taken. However, all of the reviewed records indicated that the minimum required compressive strength of 4000 psi had been met. Furthermore, the SSAT inspected all floors in both FHB units, at elevations -29.0 feet, 4.0 feet, and 30 feet, and no evidence was found that would indicate that the structural integrity of the building is questionable.

The SSAT reviewed Inspection Report 50-498/77-04, dated March 23, 1977, prepared by NRC Region IV personnel, which disclosed that cracks were observed in a Category I wall of the FHB. The report states that the cracks in the Category I wall were typical of normal concrete shrinkage cracks and could not be related to any unusual behavior of the material. The inspection included a review of concrete pour records which did not reveal any indication of defective concrete, aggregate, or water contaminated with chemicals which might degrade the structural integrity of the FHB. Also, a 100 percent inspection of all concrete slabs on soil did not reveal any cracks.

5.7.1.3 Conclusion

The SSAT determined that this allegation was not substantiated.

5.7.1.4 Action Required

None

0090

5.7.2 Backfill

5.7.2.1 Characterization of Allegation

It is alleged that the tests on the backfill material that was placed east of Unit 1 mechanical and electrical auxiliary building (MEAB-1) were not conducted in accordance with the requirements of the governing specifications. The material failed the tests and was not retested.

5.7.2.2 Details

The SSAT reviewed the records of backfill placement for the area east of the MEAB-1 made between August 20 and September 3, 1986 and also reviewed the associated soil laboratory tests performed by the Pittsburgh Testing Laboratory. The requirements and acceptance criteria for soil backfill are contained in Bechtel construction specification 5Y069Y50043, "Structural Excavation and Backfill," Revision 12, dated February 21, 1986, and the Ebasco quality control procedure 10.10, Revision 5. The SSAT review of records indicated that all four backfill placements had been recompacted until the relative density reached a minimum of 80 percent as specified in Section 7.8.13 of the specification for Category I fill. This relative density is in compliance with the American Society for Testing and Materials (ASTM) specification D2049. The ASTM specification also requires that for each four in situ relative density tests conducted, one sieve analysis (per the requirements of ASTM D422) was sampled from the same location.

The SSAT reviewed two reports of soil uniformity and the coefficient of uniformity for the backfill in question. In both cases, results exceeded the requirements specified in Section 6.2.2 of the specification.

In addition, the SSAT inspected the area of alleged concern and did not observe any indications of degradated subsoil.

The SSAT also reviewed 14 germane backfill inspection reports dated August 20, 1986 through September 9, 1986 and the following associated Pittsburg Testing Laboratory (PTL) Reports:

- 15 in-place density test by sand cone method reports
- 5 minimum/maximum density determination reports
- 4 coefficient of uniformity reports
- 5 sieve analysis reports

The SSAT review found that the uniformity coefficient on the PTL uniformity reports referred to an unrelated ASTM specification, D2487-69, instead of to ASTM D653. The SSAT determined that this was a typing error and the correct testing had been performed. This matter was brought to the attention of onsite PTL personnel who subsequently corrected the documentation error.

The SSAT was also informed that another area of concern was the backfill placed west of the fuel handling building, Unit 2 (FHB-2) on August 15, 1986 at elevation 26.0 feet. Eight backfill packages pertinent to that time and location were reviewed. The area reviewed covered the backfill from elevation 24.0 feet to elevation 26.5 feet, which is the top elevation for the backfill west of the

FHB-2. The SSAT determined that all tests were performed satisfactorily and the results did not indicate any problems.

In addition, the SSAT inspected the area of alleged concern and did not observe abnormalities that might indicate degradation of the subgrade soil strata.

5.7.2.3 Conclusion

The SSAT determined that this allegation was not substantiated.

5.7.2.4 Action Required

None

5.7.3 Cutting of Reinforcing Bars (Rebar)

5.7.3.1 Characterization of Allegation

It is alleged that reinforcing bars were drilled through or cut without being monitored and without taking into account reduction of safety margins in the affected structures. The procedures that would prevent such a situation were issued after the damage was done.

5.7.3.2 Details

The SSAT interviewed the responsible Bechtel engineers concerning the control and evaluation of cut rebar at STP. SSAT was informed by Bechtel engineers that Bechtel had collected and recorded information pertaining to any cut rebars from a variety of sources.

Before the Bechtel Power Corporation assumed the responsibility for design, Brown and Root (B&R) documented the cutting of rebar on field requests for engineering assistance (FREAs). B&R developed calculation CS-92 which assessed the damage done to structural members due to cut rebars. This calculation was a cumulative record of cut rebar as construction progressed. On January 8, 1980, operational procedure COP-5, "Core Drilling," was issued to describe the concrete core drilling process to be used to ensure compliance with STP specification 2A010CS28, "Concrete Construction."

During the turnover from B&R to Bechtel, Bechtel performed a walkdown to verify the as-built condition of structures. During that time, some additional drilled holes were found which were not accounted for in B&R calculation CS-92. However, each hole was traced to an FREA, indicating that some assessment of the significance of cut rebar had been made. Additional information pertinent to cut rebar was obtained from nonconformance reports (NCRs) issued by Bechtel on the basis of findings from the phase A transition drawings and from the findings identified by the new builder, Ebasco. Furthermore, additional information regarding cut rebar was obtained from the B&R show-cause documentation for concrete.

The SSAT reviewed the pertinent correspondence by HP&L which indicated that in early 1981, steps were taken to stop the use of diamond drill bits at STP. SSAT questioned whether all the rebar cut during the installation of expansion anchors before the turnover to Bechtel had been accounted for. Bechtel engineers responded that at the time of turnover, no expansion anchors had been installed at STP.

At the present time, concrete drilling operations are controlled by standard site procedure SSP-5, "Coring, Cutting or Drilling Concrete," dated June 1, 1987. Procedure SSP-5 is in accordance with Bechtel specification 5A010SS1000, "Installation of Expansion Anchors, Rock Bolts, Grouted Anchor Bolts and Core Drilling" (Spec-1000), which details the responsibilities of the rebar cutting engineer (RCE). Spec-1000 designates certain areas in the plant where approval of a request to cut rebar (RCR) by the RCE can be made on the basis of judgment rather than on an analytical evaluation. Since the areas are not sensitive to cutting of a rebar, SSAT found that the cutting of rebars to date has not been very damaging to structural members at STP. There are no reinforced concrete beams at the plant (all beams are steel). Concrete beams are very vulnerable to rebar cutting. Most of the concrete structures are flat slab types. There are only about 18 reinforced concrete columns in the mechanical and electrical auxiliary building (MEAB). Although some drilling has been done in the columns, an engineering evaluation was conducted for each. Also, there are reinforced concrete struts in the isolation valve cubicles (IVC) beams in the roof of the MEAB, but no drilling was done in these items.

During a walkdown in the plant, the SSAT located three 1-5/8-inch-diameter holes that contained partially cut rebar in a wall in valve room 209, Unit 2 reactor containment building, at floor elevation 19 feet 0 inch. SSAT used this as an example to verify the consistency between the procedures and the practice of core drilling at STP. The SSAT found that this core drill corresponded to RCR No. 20253-P, dated April 4, 1986. The RCR required that no rebar cutting was allowed without an approved field change request (FCR). Contrary to this requirement, it appears that a rebar was cut without initiating an FCR.

The holes were made for concrete anchor bolts that were part of a pipe snubber installation. However, the pipe snubber was later eliminated and the RCR was voided before the required FCR had been issued. This was an incorrect implementation of the program since (1) the rebar had been cut without a followup FCR or a revision to the RCR to incorporate cutting of rebar and (2) since the drilling had been already done, elimination of the snubber should not have been the basis for voiding the RCR. Consequently, Bechtel Engineering directed the builder to issue an NCR to document the improper implementation of the procedure. The SSAT reviewed NCR CC04454 dated January 21, 1988, which states that project engineering has reviewed the cut rebar and determined that the structural integrity of the wall had not been adversely affected.

RCR 2-0253-P, dated January 30, 1987 amended the original RCR 2-0253-P and a sketch dated January 25, 1988 identified the location, the number, and the size of the cut rebar. Additionally, the SSAT reviewed the cut reinforcing tracking drawings BFS-21540 CR, Revision 4, dated September 10, 1987 for Unit 2, reactor containment building, in which the cut bar was identified. The SSAT determined that this was the only instance found during the inspection in which a concrete core drill was made and rebar was cut that did not have all of the documentation as required by site procedures. All other core drilling and rebar cutting locations, evaluations, and documentation examined by the SSAT were adequately addressed.

5.7.3.3 Conclusion

The SSAT determined that this allegation was not substantiated. SSAT inspection determined that Bechtel, during the turnover period, embarked on an extensive program to account for all of the holes drilled in concrete and for all of the rebars cut before takeover by Bechtel. The SSAT determined, on the basis of its review during the inspection, that the program should provide reasonable assurance that all of the rebars cut in concrete members have been accounted for.

5.7.3.4 Action Required

None

5.8 Protective Coating Systems

5.8.1 Conformance With FSAR Requirements

Although the SSAT initially identified a single allegation for onsite inspection, the nature of the inspection planning and effort resulted in the evaluation of all other coating allegations. Thus, the following paragraphs discuss all the areas and concerns addressed during the inspection of the coating issue.

5.8.1.1 Characterization of Allegation

It is alleged that the application and inspection of coatings on minor surfaces and the control of coatings on miscellaneous surfaces inside the reactor containment building (RCB) do not comply with the requirements of FSAR Section 6.1.2.1. Additionally, it is alleged that non-quality miscellaneous coatings are not traceable.

5.8.1.2 Details

FSAR Section 6.1.2.1, "Protective Coatings," groups the protective coatings on steel and concrete surfaces inside the RCB into three categories: major, minor, and miscellaneous surfaces. Larger surfaces, such as the liner plate and structural steel, are listed as major surfaces; minor surfaces include areas as routine touchup of damaged qualified coatings less than 30 square inches in area, spot priming of bare areas, and coating of surfaces where access is limited for optimal performance of coating work. All coatings that do not fit into the major or minor categories are considered to be unqualified and are assumed to fail under design-basis accident (DBA) conditions.

The SSAT reviewed "STP Technical Specification for Field Coatings of Surface Inside the Reactor Containment Building, No. 3C080AS1001," Revision 17, dated September 9, 1987 to determine the conformance to the commitments of the FSAR. The coating schedule provided as Table 6.1-4 of the FSAR was found to be adequately reflected in the "Coating Schedule," attachment A to field coating specifications. In addition to specifying the schedule of which area was to receive a specified coating system, this technical specification provided coating system standards for each system which detailed the required surface preparation, coating and primer requirements, and inspection points and attributes. Further information on the coating systems, materials, application, inspection, and remedial work was detailed in the main body of the specification.

For major surfaces, the FSAR states that the coatings are applied according to NRC Regulatory Guide 1.54, "Quality Assurance Requirements for Protective Coating Applied to Water-Cooled Nuclear Power Plants." Regulatory Guide 1.54 endorses the requirements and guidelines included in American National Standards Institute (ANSI) standard N101.4-1972, "Quality Assurance for Protective Coatings Applied to Nuclear Facilities," as an acceptable means of providing a basis for complying with the quality assurance requirements of Appendix B to 10 CFR Part 50.

The SSAT reviewed the STP construction site procedure CSP-30, "Field Preparation and Coating of Surfaces Inside the Reactor Containment Building," Revision 8, dated December 21, 1987, to ensure that the requirements of the specification were properly addressed in the areas of inspection and testing and remedial work. Additionally, the inspections detailed in quality control procedure 10.8, Revision 9, dated May 9, 1987, "Protective Coating Inspection," were reviewed for consistency with the requirements of the specification and application procedure requirements. The SSAT review of these procedures indicated that the requirements were properly detailed.

With regard to the application and inspection of remedial work and touchups, the FSAR states that the procedures specified provide assurance of coating integrity for these minor surfaces where total compliance with Regulatory Guide 1.54 is impractical. Section 9.1.6 of the specification states that the documentation and inspection of damaged coatings less than 30 square inches are considered as non-safety-related activities and are performed in accordance with approved site procedures and do not require inspection by safety-related QC inspectors. This is further amplified by CSP-30, Section 9.01, which states that the inspection of these repairs should be in accordance with inspection procedure IP-21, "Inspection of Non-safety Related Coatings Outside the RCB." Procedure IP-21, while not requiring QC Inspection involvement, does require that specific attributes be inspected by the responsible field engineer.

Section 10, "Remedial Work," of the specification provides the general and specific requirements for the coating repairs. On the basis of the original coating system utilized, the surface preparation and coating are defined. An allegation was made in this area that a one-coat repair was being utilized. The SSAT determined that this was, however, authorized as an approved repair system and was defined within this section and in the remarks to the applicable coating schedule. The specification also provides for lapping the coating system used for repair over the surrounding sound coating by 1 to 2 inches.

For the touchup of the C-202 H and C-213 coating systems as used on the polar crane and orbital bridge for Unit 1, the SSAT determined that the remedial requirements of the specification and the referenced notes (attachment A1-9) in the remarks section of each room/area coating schedule allow a single coat of white epoxy-phenolic (coating standard EF-03) to be used. The coating standard EF-03, one coat of Amercoat 90 was documented by Bechtel to be a qualified coating system for the RCB. The testing to substantiate this dedication was done by the Oak Ridge National Laboratory (ORNL). Bechtel technical report 8603-02EV, "Report on Nuclear Coating DBA Testing and Post DBA Long Term Immersion Testing," summarized the results of the testing for this and other systems and provided the ORNL results and data in an attachment. The SSAT determined that the documentation for the preparation of the test coupons, testing, and results were found to satisfactorily support the qualification of this system for STP.

The FSAR states that all coatings that do not fit into the major or minor categories are considered unqualified and are assumed to fail by disintegration or debonding under DBA conditions. Coatings on surfaces that are insulated or otherwise enclosed are not included. The FSAR also details within Table 6.1-4 the estimated quantity of unqualified coatings applied. By means of calculations, the possible failure of these quantities and types of coatings have been found not to impair the operation on safety-related emergency core cooling system (ECCS) equipment during a DBA. Calculations 2N122MC6017, entitled "RCB Floor Paint Chip Analysis"; 2N129MC5647, entitled "Analysis of the Transport of

Paint Chips to ECCS Sumps, Reactor Cavity Coating"; and 2N129MC5648, entitled "Analysis of the Transport of Paint Chips to ECCS Sumps, Unqualified Coatings, Light Fixtures and Control Panels" were reviewed by the SSAT and found to support the FSAR. The SSAT found that calculation 2N122MC6017 is no longer applicable since the sealer coating has been DBA tested to 3.3 mils dry film thickness (DFT). Since the square foot area is an estimate, note 6 to the table states that the quantities will be verified as work progresses. This was done through the use of the unqualified coatings log which records the specific locations, area, and weight of these coatings. The SSAT reviewed the log and found it to contain 32 item entries and references to documents describing the items.

These data are then utilized as input into calculation 9AC5002 which verifies that the FSAR limits have not been exceeded by coating type. This calculation was presently being revised to include later log entries and changes.

5.8.1.3 Conclusion

The SSAT determined that the allegations within this area were not substantiated. The requirements for the control of both the qualified coatings and unqualified coatings as specified in the FSAR were met within the project specifications and supporting procedures.

5.8.1.4 Action Required

None

5.8.2 Deterioration of Installed Coatings

5.8.2.1 Characterization of Allegation

It is alleged that the coating system used on crane and bridge platforms is flaking. It is also alleged that the coatings are coming off in sheets from non-Q floors (unspecified location).

5.8.2.2 Details

The SSAT visually inspected the coatings on selected structures in the reactor containment building (RCB) for evidence of presently existing deterioration of the coating systems in terms of either signs of flaking or discoloration due to corrosion of the metal surfaces. The SSAT found no signs of flaking in the areas inspected and the only appreciable sign of discoloration of any coating was due to leakage of lubricants from the polar crane machinery onto the support girder (see Figure 5.8-1). This grease, however, does not appear to be affecting the coating integrity. The inspection included both the original coating and the touchups and repairs done to these structures.

One small (9-inch x 12-inch) area under a lamp maintenance/access plate on the polar crane catwalk was found by the SSAT to be improperly coated (see Figure 5.8-2). The area had been taped before application of the topcoat, possibly as the attachment point for the lamp. However, when the lamp was attached in another location, the tape was not removed and the area was not topcoated. There were also several small areas under the girders above the trucks for the crane where the topcoat had not been applied. It appears that the girder had been resting on blocks in this area when the topcoat had been applied. The SSAT determined that the proper thickness of inorganic zinc primer was found in these areas.

Additionally, the coated surfaces were inspected by the SSAT for signs of covered surface contamination due to improper cleaning before paint application. The SSAT found no evidence of this condition. The inspection program provides for reviewing this attribute before application of the primer.

A walkdown of the stairwells and three levels of the Unit 1 mechanical and electrical auxiliary building was conducted by the SSAT. The coatings on the floors were found to be intact, adhering, and fully covering the floors.

5.8.2.3 Conclusion

The SSAT determined that these allegations were not substantiated. No evidence of lack of integrity of the reactor containment building coatings was evident. Also, the floor coatings in the mechanical and electrical auxiliary building were found to be satisfactory.

5.8.2.4 Action Required

None

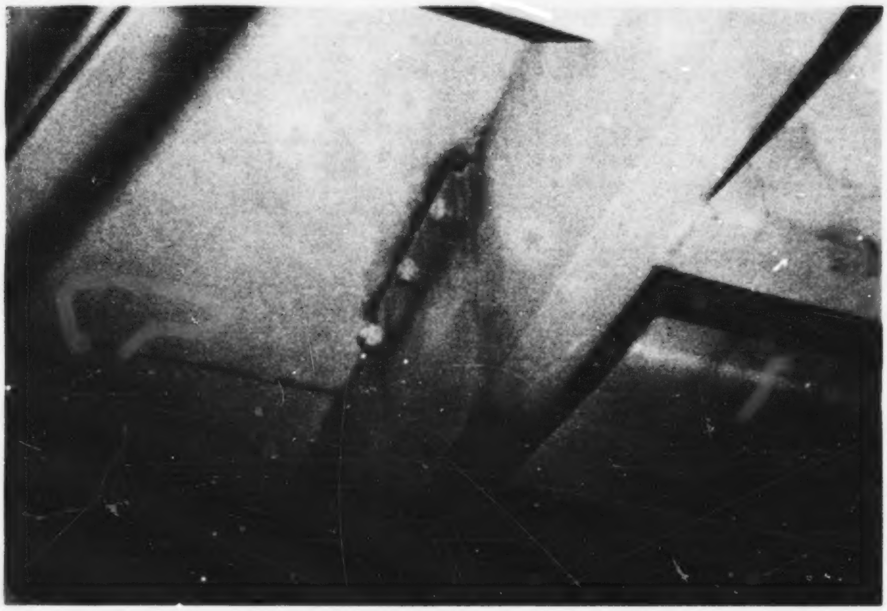

Figure 5.8-1 Discoloration of Polar Crane Coatings Due To Leaking Grease From Hoist Operating Mechanism

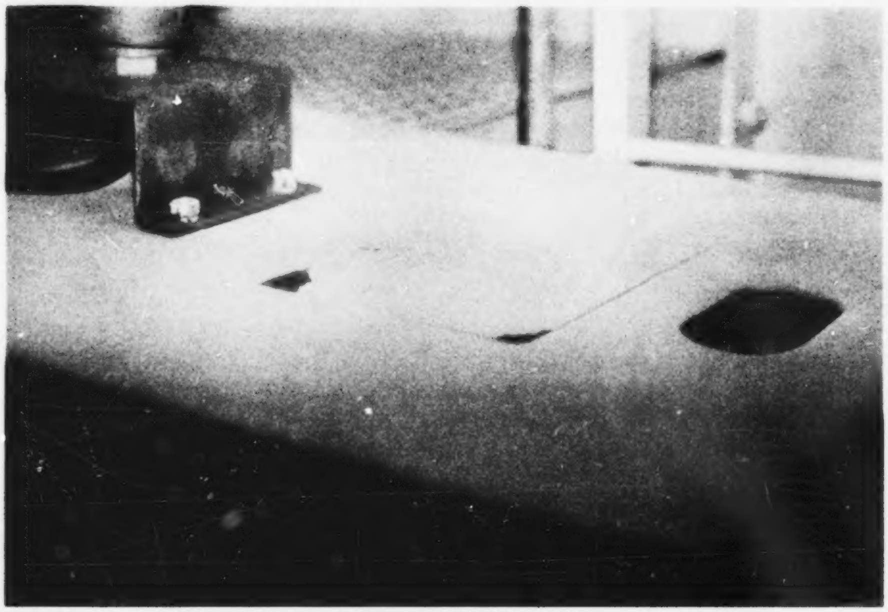

Figure 5.8-2 Area Under Lamp Maintenance Access on Polar Crane Catwalk With Taped Areas Not Coated

0099

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5.8.3 Nonconforming Conditions

5.8.3.1 Characterization of Allegation

It is alleged that coatings are frequently applied without taking dewpoint and ambient temperature readings. It is also alleged that many one-coat repairs to bare spots on steel were larger than 30 square inches in area.

5.8.3.2 Details

Section 9.1.5 of the coating specification states that ambient temperature is an inspection holdpoint and will be recorded before application. Quality control procedure QCP-10.8 provides for this inspection requirement, and the information is to be recorded in Section 40 of the Steel Coatings Inspection Report.

SSAT review of nonconformance reports written against painting systems on the polar crane noted several instances where ambient conditions were not taken during the drying process. These were dispositioned and accepted after the completion of a pull test which determines the adhesive capability of the coating. Further, as previously stated, SSAT walkdown of the Unit 1 structures did not provide evidence of coating failure from adhesion problems.

During this walkdown, the SSAT also reviewed the structures for signs of single-coat repairs greater than 30 square inches. No specific repair that exceeded this limitation was found on the accessible portions. Since an overlap of 1 to 2 inches is allowed onto the adjacent coated surface, some repairs may have appeared to be larger than the allowed limit. The SSAT was not able to identify any location that did not comply with the requirements.

5.8.3.3 Conclusion

The SSAT determined that this allegation could not be substantiated. The SSAT found the application and inspection of original coatings and repairs to be acceptable in the areas reviewed.

5.8.3.4 Action Required

None

5.9 Quality Assurance and Quality Control

5.9.1 Installer's ASME Code Data Report (N-5)

5.9.1.1 Characterization of Allegation

It is alleged that:

- The Ebasco Services, Inc., group responsible for preparing the installer's N-5 code data report had difficulty developing this report because of the numerous deficiencies with the input documents.
- Documents were not completed according to American National Standards Institute (ANSI) standard N45.2.11 before going to the N-5 group.
- Discrepancies were found on documents such as non-destructive examination (NDE) reports or QC inspection reports.
- Numerous documents supporting the N-5 code data report have missing and incorrect heat/lot numbers and these documents did not reflect the as-built configuration of the system.

On the basis of interviews with the alleger, the deficiencies existed during a period in the early stages on the N-5 program.

5.9.1.2 Details

Ebasco Services, Inc., as the American Society of Mechanical Engineers (ASME) NA Certificate Holder installing the ASME Code Section III piping systems, is responsible for the preparation and certification of the N-5 code data report. The N-5 code data report documents the installation of components, appurtenances, parts, piping subassemblies (spools), component supports, and material. In this regard, it also documents the field fabrication of parts, piping subassemblies and component supports, and field modifications. In developing these data reports, other data reports, such as the piping subassembly report (NPP-1) and valve manufacture report (NPV-1), which are part of the basis for the approval of the N-5 code data report, can be compiled in one of several ways as allowed by ASME. If they are not attached directly to the N-5 report, each can be assigned a unique identifying number and listed in the report, or a drawing that uniquely identifies each item can be attached to the report. At STP, the unique identifier number has been utilized.

Each of the installer's N-5 packages may document and certify all or only a part of the piping that comprise an N piping system, as defined on piping and instrumentation diagrams (P&IDs) and the design specifications. The N stamp holder, Bechtel Western Power Corporation in most instances, assembles the installer N-5 packages into groups comprising each N system and prepares a master N-5 for certification by Bechtel and the authorized nuclear inspector (ANI).

The SSAT reviewed standard site procedure SSP-21, Revision 2, dated December 31, 1987, "Preparation and Certification of ASME Code Data Reports," as the basis for the activities involved in the preparation of these reports for both Ebasco and Bechtel. In addition to this procedure, more details relating to the actual preparation of the reports and examples were provided in "Ebasco N-5 Desk Top Guide," Revision 1, dated November 20, 1987. These procedures provide satisfactory guidance and details to prepare the data reports.

The allegations were centered around concerns that the installer's N-5 group was not able to compile and document a valid N-5 code data report because numerous deficiencies existed in the component data reports and other documents used as the basis for the N-5 package. The SSAT found that similar concerns in this area had arisen early after the establishment of the installer's N-5 program in 1985. These concerns had been presented to both the HL&P's SAFETEAM and the NRC. For purposes of establishing the background and degree of corrective action taken, the SSAT reviewed NRC Region IV Inspection Report 50-498/87-07 and 50-499/87-05 which evaluated and closed several allegations dealing with the HL&P's SAFETEAM concern and the documentational errors encountered in the N-5 packages. This inspection report substantiated the fact that numerous errors were appearing in safety-related record packages, that procedures were not well formalized for documenting problems, and procedures did not clearly define the responsibilities for the review of records. However, by the time the NRC Region IV report was issued (June 1987), followup reviews by the NRC and audits by Ebasco, Bechtel, and HL&P appear to have corrected the major problems with the implementation of the program for development of data reports.

Because it had been well documented that documentational errors existed, the SSAT approached the allegation from the aspect of verifying that the corrective actions for both the process and quality of the output reports were presently adequate.

When the N-5 group was first established in late 1985, the activities governing this process were delineated in quality control procedure QCP-17.2. This procedure was shortly replaced by quality assurance instruction QAI-25, and then by the present standard site procedure SSP-21. Because documentation for the N-5 data reports comprised records that were to have been previously reviewed, the SSAT reviewed standard site procedure SSP-56, Revision 6, dated July 31, 1987, "Project Record Review Program," to verify that the necessary emphasis had been placed on the correction of record deficiencies and improvement of their overall quality. This procedure was found to satisfactorily implement a coordinated process for the review of these documents and provides a mechanism for resolving noted deficiencies.

In order to determine if the record review program and the code data report preparation program have been properly implemented and are now providing adequate documentation, the SSAT performed a detailed review of the N-5 package and supporting documentation for several selected areas of two systems. The systems selected were the reactor makeup water (RM) systems and the essential cooling water (EW) system. In addition to this documentation, the SSAT reviewed the general surveillance reports from May 1986 to October 1987 relating to the monitoring of activities in the N-5 data report preparation, audit plans and reports on this subject, and the standard deficiency reports prepared to implement corrective actions resulting from these activities. These surveillances and audits appeared to adequately cover the major areas of the N-5 preparation process and performed a detailed review of several data packages to determine if the documentation was an accurate reflection of the actual conditions.

Likewise, the SSAT selected a sample from the RM and EW systems and verified the accuracy of the N-5 data report for the area selected. For the RM system, the SSAT reviewed all the documents associated with lines 4-inch RM 1003 and 4-inch RM 1002, and for the EW system, lines 2-inch EW 1313, 8-inch EW 1384, and 14-inch EW 1302. Additionally, the documentation for the pipe supports was reviewed for line RM 1011 and RM 1015.

The review encompassed the following types of documentation for each system: N-5 data report with supplements and addendum, field weld packages and process control checklists with nondestructive examination (NDE) record sheets, valve packages with valve control cards and bolted flange connection checklists if applicable, hanger packages with sketches and process control checklists, P&IDs, isometric drawings, bills of material, unincorporated field change requests, an NCR summary, piping design specifications, and manufacturer's certified material test reports, certificates of conformance, or data reports for selected components (i.e., spools, flanges, elbows, valves, thermowells, orifice plates). SSAT review found that each of the supporting documents was correctly reflected in the N-5 data report and that the required visual, nondestructive testing, and mechanical inspections were conducted as required by the piping specification and the ASME Code. The only error noted was an inaccurate serial number for flow control valve FV-7663 in line RM 1003, recorded on the Process Control Checklist for field weld FW0009. The correct serial number was recorded in the N-5 data report and was field verified. This item was corrected during the SSAT inspection. The SSAT also compared the isometric drawing to copies of the stress isometrics to verify that hangers utilized in the stress analysis concurred with the supporting N-5 documentation.

The SSAT also reviewed the hydrostatic test package for the EW system to determine if the boundaries were adequate and to verify that the test criteria and pressure were in accordance with ASME Code and specification requirements. The SSAT determined that this area was satisfactory.

The SSAT noted that the N-5 code data report for the RM system contained three addenda. The issuance of the first two addenda corrected a number of deficiencies with the information provided in the original report as well as added new items. It was also noted that the RM system data report was the first package prepared by the installer. During the SSAT review of the three installer N-5 packages comprising the EW system, no addenda were encountered.

5.9.1.3 Conclusion

On the basis of the evidence presented in the NRC Region IV Inspection Report 50-498/87-07, audits, surveillances, and the early version of the RM system N-5 package, the allegation that the installer's N-5 group had difficulty preparing valid data reports because there were numerous errors in input documents was substantiated. However, the SSAT found that the basic causes of the problem were corrected through an increased emphasis on document reviews and the upgrading of the controlling procedures. Also, the numbers of audits and surveillances by the project organizations indicated that emphasis was placed on correcting the situation and maintaining an adequate program.

5.9.1.4 Action Required

None

5.9.2 As-built Configuration

5.9.2.1 Characterization of Allegation

It is alleged that the configuration of the installed equipment is not properly reflected by the as-built design drawings. It is also alleged that the design drawings frequently show installations that are not actually installed.

5.9.2.2 Details

In combination with the previously described documentation reviews, the SSAT performed a walkdown and visual inspection of various lines in the RM and EW systems which had also been reviewed for the adequacy of the N-5 data report documentation. Specifically, the SSAT conducted the inspection of line 4-inch RM 1003 and the reactor makeup water pumps, and lines 2-inch EW 1384 and 8-inch EW 1302. The correlation between the hardware and the data recorded in the N-5 code data reports were verified for the following items and attributes: physical markings and identification on spools, flanges, elbows, and other material; the model and serial numbers on the system valves and pumps; the proper number and location of pipe supports verified against the location specified on the stress isometric drawings; the orientation of the valving in terms of operator position, flow direction, and location as well as the serial number and correct flow orientation for orifice plate inserts; visual weld quality of selected pressure boundary and support welds; and the correct bolting and gasket types, as physically visible, in bolted flange connections as compared with the information provided on the isometric drawings and bill of materials.

The results of this SSAT walkdown were satisfactory. The only item noted was that corrosion was observed on the flange bolting for the essential cooling water inlet valve, EW-093, to the C essential chiller (3V111VCH003). Although the red rubber gasket material was installed, the bolts were corroded, either because of a previous leak or missing or damaged cadmium coating on the bolts.

5.9.2.3 Conclusion

The SSAT determined that the allegations that the plant systems were not installed as delineated on the design drawings found in the document control system could not be substantiated. Without specific locations, a sample was selected from two ASME Class 3 systems. The configuration of each area reviewed was found to be fully reflected in all applicable design documents.

5.9.2.4 Action Required

None

5.9.3 Post Certification Modifications

5.9.3.1 Characterization of Allegation

It is alleged that piping subassemblies, which were provided with an NPP-1 data report and NPT code symbol stamp, were modified during field installation.

5.9.3.2 Details

The SSAT determined that a pressure boundary system may be modified under the rules of ASME provided that the changes are reflected in the design report and are appropriately inspected and accepted. Standard site procedure SSP-21 requires the marking of the manufacturer's data report to reflect that the item or spool was modified. The documentation of the modification work then becomes part of the supporting documents for the installer's data report.

5.9.3.3 Conclusion

Although the SSAT did not encounter actual cases in which the pipe subassemblies were modified during field installation, the allegation defines a process that is allowed and is adequately controlled. Thus, the SSAT determined the allegation could not be substantiated as a problem area.

5.9.3.4 Action Required

None

0106

5.9.4 Failure To Perform QC Inspection

5.9.4.1 Characterization of Allegation

It is alleged that when the craftspeople were attempting to install several thermocouple wells in the piping for the closed cooling water system, the well holes in the piping spool were found to be too small for the thermowells, and the holes were bored to a larger diameter to accomplish the installation. It is further alleged that the work was completed without preparing the required documentation and without having the Quality Control organization inspect this reworking.

The SSAT interviewed the alleger who provided additional information, as indicated below.

5.9.4.2 Details

The alleger stated that the nonconforming condition was brought to the attention of the Quality Assurance organization and the two thermocouple wells were subsequently reworked to correct this condition.

5.9.4.3 Conclusion

As stated by the alleger, the technical problem associated with the allegation was corrected after the appropriate Quality Assurance management personnel were made aware of the situation. The SSAT concludes that there is no need to review this allegation further. However, the possible wrongdoing aspect of this allegation has been referred to NRC OI for further review.

5.9.4.4 Action Required

None

5.9.5 Field Document Control

5.9.5.1 Characterization of Allegation

It is alleged that because of problems with field document control, work is being conducted to other than the latest revision of design drawings, and when these documents are revised, the superseded documents should be retrieved.

5.9.5.2 Details

Along with the reviews conducted for the other allegations, the SSAT reviewed numerous design documents from field organizations and document control. In order to verify that the correct documentation had been provided, the field revision list and the design current revision list for selected items were reviewed by SSAT. No instances were encountered in which other than the latest revision were received.

Drawings, specifications, and other documents provided for use in work packages and inspections are accounted for and tracked on logs maintained by the field document control organization. The SSAT determined that when new revisions are issued, the superseded documentation is recalled and the revisions are issued. Finally, a records check is performed upon the completion of work by a records reviewer to determine whether the latest documents were utilized for the construction and inspection.

The SSAT inspected the as-built configuration for several systems and structures using the latest drawings, specifications, and sketches. The SSAT noted no that would indicate that the actual configurations were not in agreement with the latest design.

5.9.5.3 Conclusion

The SSAT determined that this allegation was not substantiated. A system was in place and functioning that controls the area of concern. Also, no instances were noted with the documentation and configurations to indicate that the program was not being administered properly.

5.9.5.4 Action Required

None

5.9.6 HVAC Calculations

5.9.6.1 Characterization of Allegation

It is alleged that HVAC stress analysis calculations are missing from the permanent records vault.

5.9.6.2 Details

The only information made available to the SSAT was that the HVAC stress analysis calculations were missing from the permanent records vault. The alleger was not made available for an interview to determine if there were any other concerns associated with the alleged missing calculations.

The SSAT was able to determine during the onsite inspection at STP that "the original HVAC calculations" were kept in the Bechtel Site Engineering Office (SEO). Specifically, three volumes of HVAC calculations, CC-9600, CC-9601, and CC-9615, were examined by the SSAT in the SEO. The permanent calculations of record are microfiched and stored on site in the Unit 1 Operations Document Control Center and in Houston in the Offsite Record Retention Facility.

5.9.6.3 Conclusion

The SSAT determined that this allegation was not substantiated. The permanent calculations of record for HVAC stress analysis are stored in both onsite and offsite locations in permanent storage facilities.

5.9.6.4 Action Required

None

5.10 Polar Crane and Orbital Bridge Deficiencies

5.10.1 Characterization of Allegation

It is alleged that the polar crane and orbital bridge of STP Unit 1 has the following deficiencies:

- The polar crane and the orbital bridge track was out of round. This condition caused excessive wear on the polar crane and orbital bridge wheels.
- The polar crane and orbital bridge did not have a permanent linkage mechanism. During crane operations, the crane wheel would hit the orbital bridge, damage the crane wheel, and also cause orbital bridge misalignment to the track. Also, the polar crane and the orbital bridge were eventually tied together with rigging ropes to satisfy the safety department.
- The bearing that the orbital bridge is supported from and pivots on at the top of the reactor containment building dome had collapsed. The safety lugs that are part of the pivot bearing assembly were supporting the orbital bridge. The safety lugs were being damaged as the orbital bridge rotated about the pivot assembly. These deficiencies were reported to quality control personnel and no corrective actions were taken. Also, the alleger tried several times to contact the NRC Region IV offices to report the polar crane and orbital bridge deficiencies; however, the NRC Region IV offices never returned his calls.

The SSAT interviewed the alleger who provided additional information, as indicated below, to support the allegations.

5.10.2 Details

The polar crane at STP is non-safety-related, seismically qualified, and a twin-girder crane with a 500-ton lifting capacity. The girders span the internal diameter of the reactor containment building and are supported by steel brackets that are attached directly to the reactor containment building. The polar crane is approximately 80 feet above the operating floor of the reactor containment building.

The orbital bridge is non-safety-related, seismically qualified, and self-propelled and is used as an inspection platform. Its base rides on the same track as the polar crane. The orbital bridge is used for inspecting and servicing the containment spray pipes that are attached to the containment dome (see Figure 5.10-1).

The SSAT inspected the polar crane and orbital bridge, reviewed crane and bridge drawings, field change requests (FCRs), nonconformance reports (NCRs), deficiency reports, nondestructive examination reports, quality control inspection reports, and crane operator inspection reports. The SSAT also conducted interviews with STP site personnel who were involved with the assembly, maintenance, and inspection of the polar crane and orbital bridge. Based on the reviews, interviews and field examinations of germane documentation and hardware, the SSAT determined that at one time during construction of Unit 1, the polar crane and orbital bridge did not have the manufacturer-supplied

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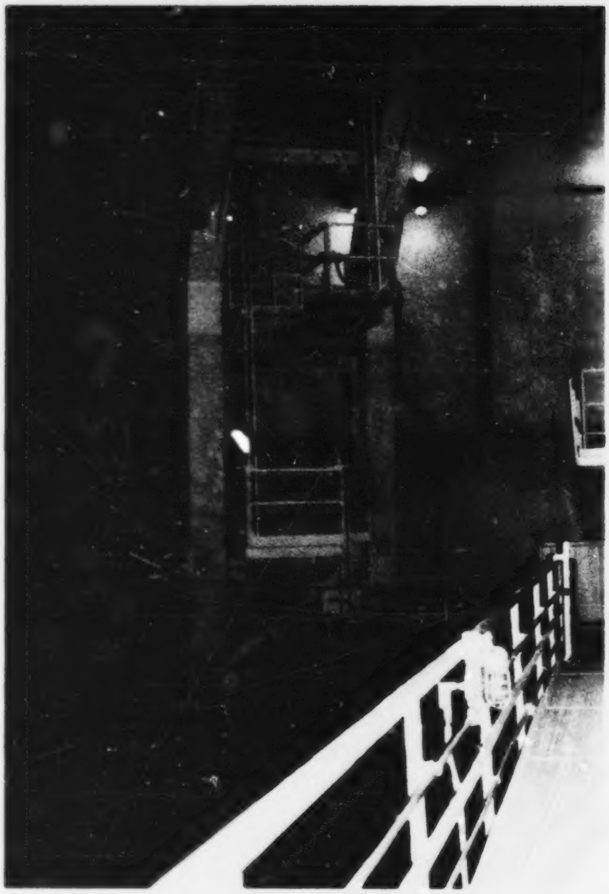

Figure 5.10-1 Lower Portion of Orbital Bridge (As Seen From the Polar Crane Catwalk)

permanent linkage mechanism in place and instead were tied together with angle iron and a "come-a-long" device (see Section 5.6.5.2 of this report for an explanation of device).

The SSAT determined that deficiency report DR 1-M-1008, dated April 12, 1986, described a deficiency with a polar crane wheel. One of the polar crane wheels was chipped when the crane was used to move the orbital bridge. The deficiency report was dispositioned to (1) immediately stop using the polar crane as a mechanism to move the orbital bridge and (2) perform a nondestructive examination (NDE) of the damaged wheel to assess the damage. The visual and magnetic particle NDE results indicated that no relevant indications were found on the wheel and was therefore considered acceptable to use.

Field change requests DM-00102, dated January 22, 1986, and DC-00889, dated March 4, 1986, provided modified details for the permanent polar crane to orbital bridge link mechanism. The SSAT determined that this modified link was subsequently installed.

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The SSAT inspected the polar crane wheels and the orbital bridge link mechanism (see Figures 5.10-2 and 5.10-3). No discrepancies were found in the SSAT inspection. In addition, the SSAT examined nonconformance report BC-00123, dated December 22, 1982, that described a diametrical survey of the polar crane rail that indicated the radius of the circular rail was out of tolerance at several locations. The NCR was dispositioned to require the out-of-tolerance rails to be reworked to acceptable tolerances. The rails were reworked and inspected to satisfactory conditions. Also, Bechtel Engineering required that the crane wheels be monitored for excessive wear at 3-month intervals, and that inspection reports be sent to Engineering for evaluations.

The SSAT interviewed responsible STP personnel involved with the erection of the orbital bridge. During the interviews and review of germane drawings and field changes, the SSAT determined that the final fitup of the orbital bridge did not conform to the manufacturer's specifications. This was caused mostly because the sum total of all other bridge tolerances, track tolerances, and the pivot bearing assembly tolerances was greater than the allowable pivot clearances. STP personnel involved with erecting the bridge did state that before the repairs, the pivot assembly safety lugs did rub against the pivot assembly adapter. STP personnel had consulted with the bridge manufacturer and both concurred that shimming and trimming the pivot adaptor safety lugs would bring the fitup within acceptable limits. This rework was described and issued on FCR-BB-00324, dated March 7, 1986. The SSAT inspected the reworked pivot assembly and found the existing conditions to be acceptable (see Figures 5.10-4 and 5.10-5).

With regard to the involvement of NRC Region IV personnel in the inspection of polar crane and bridge deficiencies, the SSAT found that Region IV personnel had performed an inspection of reported polar crane and orbital bridge deficiencies at Unit 1 of STP. Inspection Report 50-498/86-22, 50-499/86-20, Section 4, describes an allegation received as an attachment to a complaint filed with the U.S. Department of Labor (DOL) in March 1986. The report describes the followup inspection of the STP polar crane and orbital bridge deficiencies and concludes that the deficiencies were evaluated and corrected satisfactorily.

5.10.3 Conclusion

The SSAT determined that the allegations concerning hardware deficiencies involving the polar crane and orbital bridge were substantiated. However, the SSAT also determined that for all issues addressed, the deficiencies were found, corrective actions were specified, properly implemented, and inspected.

The SSAT inspection focused only on the technical merits of the allegations. The wrongdoing aspects of these allegations have been referred to NRC OI for further review.

5.10.4 Action Required

None

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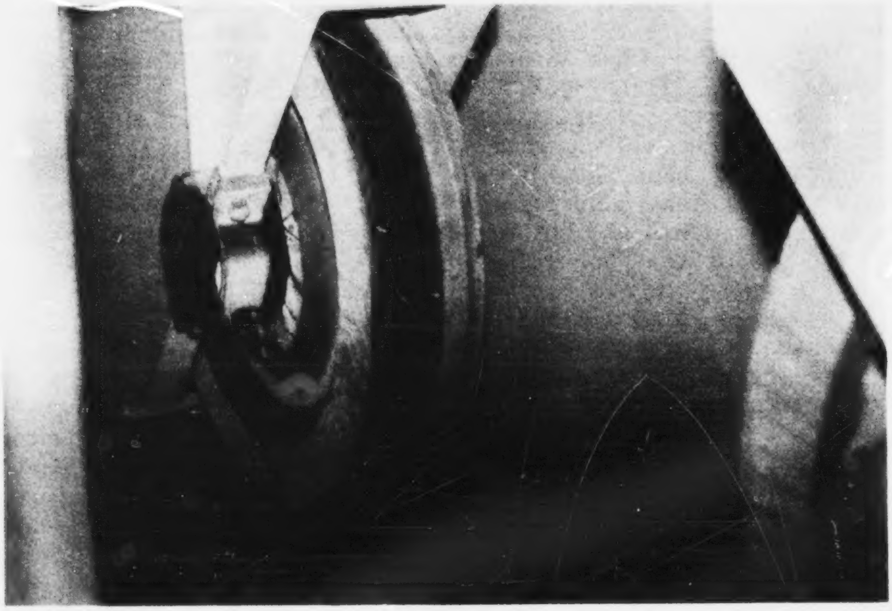

Figure 5.10-2 Polar Crane Wheel and Track

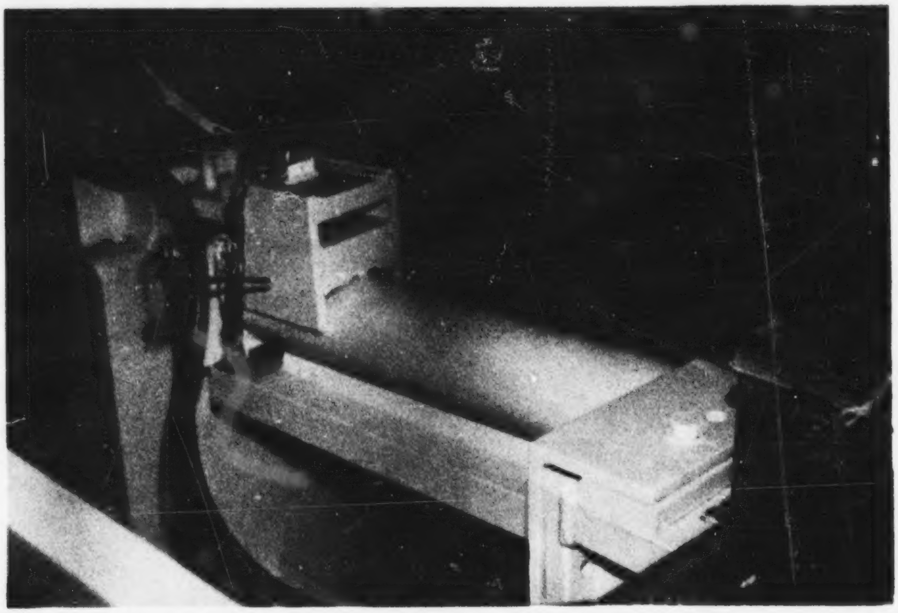

Figure 5.10-3 Polar Crane/Orbital Bridge Linkage Mechanism

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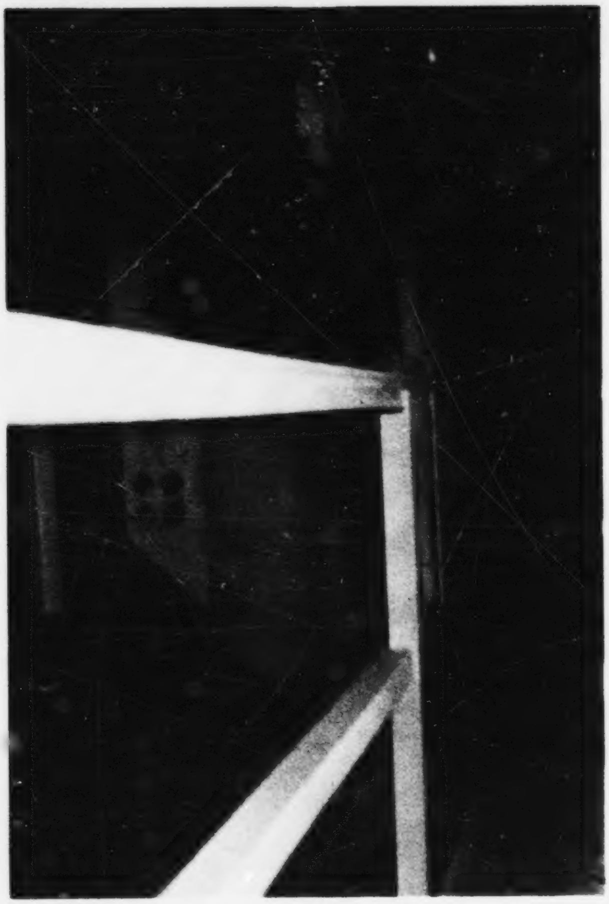

Figure 5.10-4 Orbital Bridge Pivot Assembly

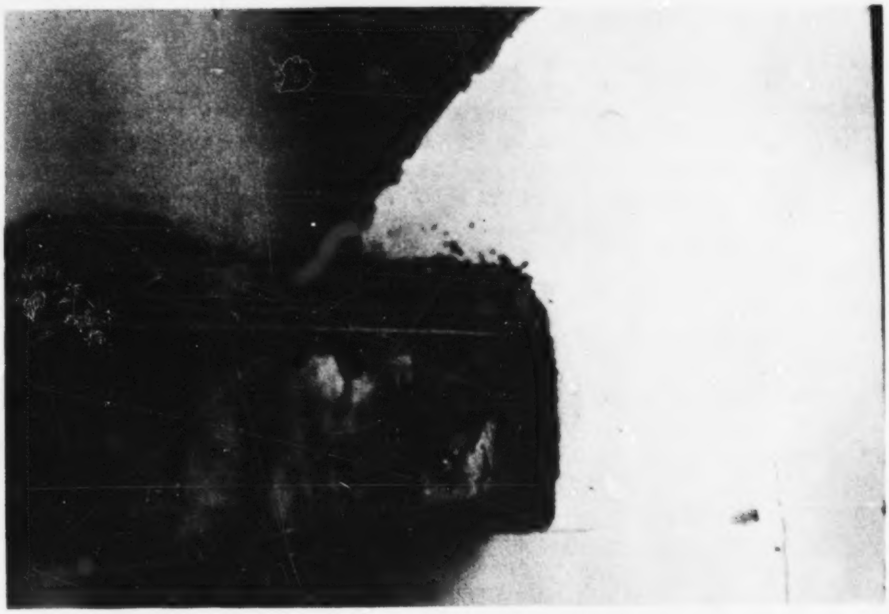

Figure 5.10-5 Modified Safety Lug on Orbital Bridge Pivot Assembly

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5.11 Non-Safety-Related Concerns

Several of the 71 allegations chosen by the SSAT for investigation at the STP facility were discovered to be non-safety-related issues during the inspection. These non-safety-related items were either addressed individually because of their association with a particular plant system, component, or structure, or were addressed in combination with other similar issues in which the SSAT took a broad, general look at the area of concern. These allegations were also investigated to assure that, if substantiated, they would not affect or challenge a safety-related system or component.

Other allegations reviewed before or after the onsite inspection are addressed in this section. Although these were not specifically selected for review during the onsite inspection, they were considered and examined because of their similarity to other allegations chosen for inspection and because the alleger provided additional information to the SSAT. It was also determined in many instances that NRC Region IV personnel and HL&P's SAFETEAM had also addressed the same or similar issues. The SSAT independently reviewed the NRC Region IV and HL&P's SAFETEAM records and, as appropriate, verified the resolution of the issues through walkdown in the STP facility. The following allegations have been reviewed in the manner discussed above.

5.11.1 Diffusion Plate

5.11.1.1 Characterization of Allegation

It is alleged that a Unit 1 HVAC diffusion plate and a sliding plate that were not fabricated and installed as required by the HVAC "cookbook" requirements. This alleged Unit 1 nonconforming condition was identified when the similar diffusion plate was being fabricated and installed in Unit 2.

The SSAT interviewed the alleger who provided the information that follows.

5.11.1.2 Details

The SSAT determined from the information provided by the alleger and GAP files that the HVAC item of concern was a 48-inch x 20-inch air supply register in a non-safety-related HVAC duct in the mechanical and electrical auxiliary building (MEAB). The SSAT determined that a change to the fabrication and installation in the Unit 2 duct had been made to facilitate the fabrication, installation, and testing of the assembly. This change was made because the Unit 1 assembly had been fabricated and installed before the system was tested and balanced. The fabrication included drilling the sliding plate to provide the specific air supply rate and volume through the diffusion plate.

The SSAT determined that when the Unit 1 system was tested, the air supply rate and volume were found to be less than expected but still within the allowable ±10 percent range. The decision was made for the Unit 2 installation not to drill the sliding plate until the system was being tested and balanced in order to attain the expected air supply rate and volume.

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5.11.1.3 Conclusion

The SSAT determined that the air supply through the diffusion plate was adequate, even though it was somewhat less than anticipated. As indicated above, this allegation is considered non-safety-related and the SSAT review determined that it was not substantiated.

5.11.1.4 Action Required

None

5.11.2 Cleanliness Barriers

5.11.2.1 Characterization of Allegation

It is alleged that in the installation of components in proximity to the floors, cleanliness barriers are violated. Areas are created that will impede decontaminating the floors, if such decontamination is necessary.

5.11.2.2 Details

The SSAT found that the concerns were related to the installation of electrical component grounding straps to floors and the routing of conduits along the floors. These practices took place in the mechanical and electrical auxiliary building (MEAB).

The coatings on the floors in the MEAB are not safety-related. Also, installations inspected by the SSAT were considered to meet industry practice. Although the floor coatings in this area provide a sealant on the concrete surfaces, there is no criterion for easy decontamination.

5.11.2.3 Conclusion

As indicated above, this allegation is considered non-safety-related and the SSAT review determined that it was not substantiated.

5.11.2.4 Action Required

None

5.11.3 Worker Confidentiality

5.11.3.1 Characterization of Allegation

It is alleged that workers at STP who had concerns or problems about deficiencies in the plant were required to write their concerns on a form obtained from their immediate supervisor. The filled-out form was then returned to the supervisor for forwarding to HL&P's SAFETEAM for review and disposition. Because the workers were not given confidentiality when they reported their concerns to HL&P's SAFETEAM via their immediate supervision, they feared reprisals by management. The allegers also felt that their names and any concerns that they reported to the NRC would also be made known to HL&P.

5.11.3.2 Details

The SSAT did not review the HL&P SAFETEAM's method of handling allegations. However, independent of any licensee's program for handling allegations, the NRC has regulations that enable any worker at a nuclear facility to report his or her concerns to the NRC.

The NRC regulations as described in 10 CFR Part 19, "Notices, Instructions and Reports to Workers; Inspections," requires in part, that licensees post current copies of 10 CFR Part 19 and NRC Form 3 in a sufficient number of places to permit individuals engaged in licensing activities to observe them on the way to or from any particular licensed activity location to which the document applies, that they shall be conspicuously posted, and shall be replaced if defaced or altered. 10 CFR Part 19 fully describes the rights of workers to report to the NRC any conditions, past or present, that the worker has reason to believe may be in violation of NRC regulations as stated in 10 CFR Part 19. Workers are allowed to bring privately to the attention of NRC inspectors, either orally or in writing, any such violations of NRC regulations.

During the inspection at STP, the SSAT did find the required posting throughout the facility, which was in compliance with 10 CFR Part 19.

5.11.3.3 Conclusion

During the inspection at STP, the SSAT did find the required postings throughout the facility which were in compliance with 10 CFR Part 19. However, the possible wrongdoing aspect conveyed by this allegation has been referred to NRC OI for further review. The substantiation of this allegation was outside the scope of the SSAT review.

5.11.3.4 Action Required

None

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APPENDIX A

SAFETY SIGNIFICANCE ASSESSMENT TEAM AND OTHER GROUPS INVOLVED IN THE ASSESSMENT

The Safety Significance Assessment Team (SSAT) consisted of 15 members of the NRC staff who, collectively, represent about 350 years of engineering and scientific experience, of which about 250 years were in the nuclear field in mechanical, electrical, instrumentation, civil, structural, and metallurgical engineering; quality assurance and control; inspection, construction, operations, project management, and regulatory activities.

The SSAT members who conducted the South Texas Project (STP) onsite inspection of alleged deficiencies during the week of January 18-22, 1988 were the same individuals who initially screened the Government Accountability Project's (GAP's) allegations in November 1987. This inspection also involved NRC Region IV office personnel and site resident inspector personnel who provided background information related to previous inspection activities, as well as substantive support to the SSAT.

The SSAT sought the assistance of the Mechanical Engineering Branch and Material Engineering Branch of NRC's Office of Nuclear Reactor Regulation (NRR) to confirm the adequacy of analysis pertaining to the installation of nuclear steam supply system (NSSS) components. Other NRC offices assisted in matters related to congressional and public affairs, allegation management, interviews with allegers, investigations, and legal, editing, administrative, word processing, and telephone conference services support. Moreover, the Heritage Reporting Corporation helped SSAT record and transcribe telephone conversations with the allegers.

The SSAT members, other NRC staff, and the contractor's employees who contributed to this review effort are listed below. Following the listing of contributors there is a breakdown of NRC staff and contractor hours spent in reviewing the GAP allegations.

NRC SSAT

Name	Function	Area
J. Calvo	Director	Direction
P. O'Connor	Project Manager	Project/Allegation compilation & tracking
R. Correia	Leader	Technical overall guidance
J. Durr	Advisor to Leader	Inspection guidance
W. Johnson	Inspector	Region IV liaison
E. Tomlinson	Deputy Leader A	Alleger interview arrangements/HVAC
G. Johnson	Reviewer/Inspector	Welding
K. Naidu	Reviewer/Inspector	Electrical & instrumentation
M. Oliveri	Inspector	Nondestructive examination

NRC SSAT (Continued)

Name	Function	Area
P. Milano	Deputy Leader B	QA/QC
H. Ashar*	Reviewer	Civil/structural
A. Lee	Reviewer/Inspector	Valves
R. Lipinski	Reviewer/Inspector	Civil/structural
P. Prescott	Reviewer/Inspector	Piping & mechanical components
J. Rajan*	Reviewer	Piping & mechanical components

NRC REGION IV AND RESIDENT INSPECTOR PERSONNEL INVOLVED

L. Constable	Leader	Support and overall guidance
J. Bess	Support	Inspection
D. Carpenter	Support	Inspection
D. Garrison	Support	Inspection
E. Hildebrand	Support	Inspection
D. Hunnicut	Support	Inspection
C. Johnson	Support	Inspection
W. McNeill	Support	Inspection

OTHER NRC ADVISORY STAFF

Name	Function	Area
R. Brady	Advisor	Allegation management
C. Y. Cheng	Advisor	Materials
S. Hou	Advisor	Mechanical
P. T. Kuo	Advisor	Mechanical
W. Long	Advisor	Computer allegation data files
L. B. Marsh	Advisor	Mechanical
D. Murphy	Advisor	Investigations
A. Vietti-Cook	Advisor	Alleger interviews
K. Wichman	Advisor	Materials

OTHER NRC SUPPORT STAFF

D. Brooks	Support	Telephone conferences
F. Combs	Support	Congressional affairs
J. Gilliland	Support	Public affairs
N. P. Kadambi	Support	Project management
L. McKenzie	Support	Final word processing
R. Newlin	Support	Public affairs
P. Noonan	Support	Administrative
S. Ramsey	Support	Administrative
R. Sanders	Support	Editing

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*Participation was limited to the initial review of the allegations at GAP offices.

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CONTRACTOR: HERITAGE REPORTING CORPORATION

Name	Function	Area
C. MacGregor	Support	Recording allegers' conversations
J. Rose	Support	Recording allegers' conversations

Since November 19, 1987, when the initial assessment of the GAP's allegations commenced, until February 29, 1988, approximately 3335 NRC staff and contractor hours were spent in reviewing these allegations. This corresponds to a cost of approximately $220,000. A breakdown of these hours follows:

Personnel	Hours
• NRC SSAT	
- GAP's headquarters files review	900
- STP site inspection (1/18-22/18)	1010*
- Evaluation of balance of allegations and preparation of report	1000
• Other NRR staff	100
• NRC Region IV staff	300
• Reporting contractor staff	75
• Total staff and contractor hours	3335

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*Number includes 400 hours of overtime.

APPENDIX B

INSPECTION PLANS OF SAFETY SIGNFICANCE ASSESSMENT TEAM

I. MECHANICAL PIPE JOINTS AND WELDMENTS

1. For the piping system or subsystem selected for review, obtain the following documentation for review:

   a. Isometric design drawings and design specifications

   b. Weld process schedules as necessary

   c. ASME Section IX and other applicable portions of the ASME Code such as the sections dealing with visual and NDE inspection requirements

   d. Weld Procedure Specifications (WPS), Weld Procedures Qualification records (WPQ), Welder Performance Qualification Records

   e. Field installation specification and guides

2. Inadequate fabrication of mechanical pipe connections

   a. For the piping system sections selected for inspection, review the design documentation and installation documentation for consistency including specifications and installation procedures

   b. Determine the applicable ASME Code, ANSI B31.1, and/or Pipe Fabrication Institute (PFI) requirements for design and acceptance criteria for mechanical connections and verify consistency with field requirements

   c. Verify for selected joint designs the QC inspection procedures and bolt hole alignments, bolt torquing, and quality of gasket material

   d. Review the field installation package, travelers, and QC inspection records for the selected connections to verify the following:

      - Correct design installed.

      - QC records indicate the adequate completion of the required visual inspections.

      - Nonconforming conditions and evaluation of field changes have been properly dispositioned.

      - If a mechanical joint appears suspect, have the connection disassembled, if possible, and measure the alignment attributes.

      - Make note of any joints in systems in operation that are leaking.

- Review the results of the system hydrostatic and operational testing for evidence of mechanical joint problems.

3. Inadequate reinforcement of pipe nozzle-to-tank weld connections

   a. For the selected nozzle connections, review the design documentation and installation documentation for consistency.

   b. Verify for selected weldments that the weld joint design meets ASME Code requirements. Review the stress report for the joint selected to determine if the stress limits are not exceeded and if the connection must be reinforced.

   c. Review the field installation package, travellers, and QC Inspection Records to verify the following for the selected connection:

      - Correct weld design has been installed.

      - If the post-weld heat treatment has been utilized, review the documentation.

      - QC records indicate the adequate completion of the required visual and NDE inspections. If necessary, review the radiographs and reader sheets to determine the quality of the joints.

      - If an inconsistency with the above documentation reviews is evident or if the quality of the weldment cannot be fully determined, visually inspect the final pass of the joints.

II. AS-BUILT INSTALLATION AND CONFIGURATION CONTROL - STEAM GENERATOR AND WHIP RESTRAINT

1. Removal of pipe whip restraint no. RC1125R1

   a. Review the Field Change Request (FCR) that removed this restraint.

   b. Determine the identification numbers of the three feedwater system pipe hangers attached to the structure.

   c. Review the hanger drawings and sketches for the above feedwater hangers for inclusion of the design of the appropriate members of the eliminated whip restraint.

2. Steam Generator 1-D installed in out-of-plumb condition

   a. Obtain the Westinghouse installation specification and other installation requirements concerning steam generator placement.

   b. Obtain and review the survey and QC inspection results for placing the generator in compliance with the Westinghouse requirements.

   c. Review any discrepancy of nonconformance reports detailing the installation problems with its generator.

d. If necessary, review the results of QC inspection documentation for steam generator nozzle-to-piping connections and supports for problems caused by misalignment of the generator.

III. INCORRECTLY INSTALLED VALVING

1. Select an appropriate piping system for review such as the chemical and volume control system or the component cooling water system.

2. Obtain the following documentation for the system selected:

   a. Isometric drawings and other appropriate design drawings, such as P&ID, and vendor valve cuts or manuals

   b. System design specifications

   c. Design change documents, nonconformance reports, and as-built drawings

   d. QC inspection records

   e. System design descriptions, if available, and the FSAR

   f. Test procedures and results from system acceptance test and the cold and hot functional testing

   g. Printouts/lists of valves that had or still require rework by construction or maintenance departments

   h. Determinations when the above test and installation procedures became effective

3. For the piping system or subsystem selected, perform the following:

   a. Review the applicable field installation and inspection procedures for valves for requirements relating to correct alignment to flow and the requirements of the design specification.

   b. Review the craft and QC inspection training for valve installation.

   c. Review the system performance test results for evidence of performance that may be different from expected and make note of the areas.

   d. Review the disposition of any discrepancy reports dealing with the improper installation of valves.

   e. Using the available design information, perform a sample inspection for the correct orientation of the valves. Inspect:

      - Flow under or over the plug if the valve is a globe valve

      - Correct orientation of bonnet bleed-off and bypass porting

IV. HVAC AND WELDING

1. Obtain the following background documents for review:

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   a. Design drawings for selected sections of HVAC

   b. Design and installation specifications

   c. Design and field change documents, including nonconformance reports for the areas being reviewed

   d. As-built drawings

   e. Weld procedure specifications, and procedure and welder performance qualification records

   f. QC and NDE inspection records

   g. Pressure and/or smoke test procedures and any other appropriate performance test procedures and their results deemed appropriate

2. From the plant documentation, determine the Q-listed sections of the HVAC system.

3. Identify inadequate welds on the HVAC ductwork due to inadequate, confusing, and cumbersome design specifications.

   a. Select several sections of Q-listed HVAC system runs for review, including at least two transition support welds.

   b. From the design documents and the applicable welding code, establish the acceptance criteria for visual quality and conformance with the required weld joint design.

   c. In the review of the weld joints, focus only on field-fabricated welds.

   d. Review the QC and NDE inspection results for possible discrepancies with the required design.

   e. Review the historical records of nonconformance reports, field change notices, and requests, for evidence that problems were caused by the design specifications.

   f. Review the applicable performance test procedures and results for evidence of problems in welds due to inadequate compliance with requirements.

   g. Walk down at least three elevations of the HVAC system selected and inspect for the following:

      - Visual weld quality of field fabricated welds in accordance with design specification and the applicable Code. This may require the removal of paints/coatings to observe the weld metal.

      - Inspect the welds for proper joint design and size.

   h. For selected welds and welders, verify that the welds were performed utilizing approved and qualified weld procedures and welders in accordance with the design specifications and welding code.

i. Review any other training procedures and records for craftsmen and QC inspectors that were particular to the HVAC welding effort for proper guidance.

V. CIVIL/STRUCTURAL INSTALLATION

1. For the civil installation selected for inspection, obtain the following types of documentation for review as necessary:

   a. General area arrangement drawings and plans

   b. Applicable civil design specifications

   c. Civil installation design drawings

   d. QC inspection procedures and plans

   e. Field engineering procedures such as those that control rebar cutting

   f. Applicable ACI and other industry standards

2. Perform the following for the review of cracking in the basement of the fuel handling building:

   a. Visually inspect the basement of the fuel handling building for signs of concrete cracking.

   b. Verify, by using the QC inspection records, that the design specification and drawings were complied with, for the installation, such as for proper rebar placement, concrete pours, and concrete test results.

   c. Review the nonconformance or other deficiency reports and their dispositions for the area selected to determine compliance with the design specification.

   d. Review the disposition and supporting documentation for any field design changes involving such items as backfill, settlement, or reinforcement.

   e. Review the site procedures for the control of soil compaction and other civil installation requirements.

3. Use of foreign and counterfeit fasteners

   a. Review the documentation of the licensee's review of the problem after receipt of the problem notification from Cardinal.

   b. Review the results of the actions taken in accordance with IE Bulletin No. 87-02.

   c. Review the procurement procedures utilized for the bidding, selection, and evaluation of Cardinal and Lone Star Screw.

   d. Review the purchase specification for fasteners and compare to the bid and exceptions from Cardinal and Lone Star Screw.

e. Determine the extent of utilization of these fasteners and the specific locations and the dates of purchase and installation.

f. Visually inspect the fasteners used on the main steam safety valves, the chemical and volume control system, and the safety injection system.

- Determine if dual manufacturer marking is evident.
- Verify that the receipt inspection adequately reviewed the certified material test reports and other compliance documents for meeting the purchase order requirements.

4. Inadequate installation of Hilti bolts

a. Review the installation specification and procedures for expansion bolts for consistency with the vendor recommendations and on-site test results.

b. Review the training procedures for craft and QC inspectors for adequacy.

c. For selected installations, review the QC inspection procedures and inspection documentation for compliance with specification requirements.

d. Inspect selected Hilti bolt installation at cable tray, piping, and HVAC supports for evidence of correct installation and no evidence of lift.

e. Review the results of NRC and other audits and the evaluation of the audit findings.

f. Review the disposition of nonconformance reports and field changes involving problems with the use of these bolts.

5. Inadequate control over the cutting of reinforcement (rebar)

a. Review the procedures in place governing the cutting of rebar.

b. For the selected locations, state in the cases, verify that the procedures were complied with, and that the appropriate documentation was generated to accept the installation.

c. Review the results of the QC inspection records.

d. Review the results of NRC audits and inspections in the area of reinforcement for evidence of problems in this area.

e. Review the deficiency reports and site audit findings for items that indicate improper control of rebar cutting.

VI. WELD ROD CONTROL AND TRACEABILITY

1. Obtain and review the following background information:

a. Filler metal control procedures

    b. Filler metal procurement and receiving inspection procedures
    c. Filler metal inspection records
    d. Field procedures for the use of work travelers and rod tickets
    e. Applicable welding code

2. Perform the following to verify the acceptability of the ASME/AWS welding program:
    a. Review the station procedures for purchasing, issue, control, and return of filler metals for compliance with applicable code and regulator requirements.
    b. Review the STP training program for welders and QC inspectors in the area of welding control.
    c. Obtain and review the results of any independent audits done on the STP weld process control program from such groups as INPO, NRC RIV, NRC Construction Appraisal Team, NRC NDE van, Bechtel/Ebasco/HL&P audits, and authorized nuclear inspector (ANI).
    d. Review the results on the NRC resolution of previous allegations.
3. For selected system, review the design drawings, weld process schedules, weld procedures and work travelers to determine the correct filler metal process for the weldments selected for sample review.
4. Using the work travelers and rod tickets, attempt to determine whether the correct filler metal was utilized and the proper heat/log number was recorded.
5. As necessary, visually inspect and perform the following on the actual weldments, in an attempt to determine the correctness of the installation:
    a. Hardness and delta ferrite testing
    b. In situ metallography
    c. Review the reader record sheets and radiographs of selected welds.
    d. Using the QC inspection documentation, travelers, and other trending type documentation, review the repair history and trending.
    e. Review the results of other NDE inspections.
    f. Review the records and disposition of any discrepancy/nonconformance reports.
    g. Review any filed change documentation for problems with weld control.
6. Review the QC inspection records to determine if consistency exists between the work package documents and the inspection documentation.

VII. INSTRUMENTATION AND CABLE INSTALLATION

1. For the selected system or installation, obtain the following types of documentation for review:

   a. System P&IDs

   b. Design and installation specifications

   c. Instrument loop diagrams

   d. Environmental qualification records and other appropriate vendor documentation

   e. Applicable IEEE and ANSI standard as specified in the specifications

2. Instrument cable and power supply cable splices not performed properly

   a. Establish the acceptance criteria as specified in the following for the installation and inspection of Raychem splices

      - Raychem Manual
      - Bechtel Specification No. 5E 189 ES 1004, "Cable Splicing, Termination and Supports"
      - Ebasco Procedure CSP-8, "Cable Termination and Splices"
      - Standard Site Procedure SSP-45 issued 10/25/85
      - Systems Integration Design Guide PED-016
      - Bechtel Project Engineering Directive PED-039

   b. Collect information on the resolution of previous adverse findings in this area by reviewing the following documents:

      - Corrective action taken on the Unit 2 Stop Work Order No. F-02 for improper cable termination
      - Corrective Action Request CAR G-434 dated 5/8/84
      - Final Report for STP Pre-CAT Verification dated 7/18/85
      - NCR Nos. CE-03207 and 03213
      - Audits performed by various QA organizations

   c. Review the documentation listed below for the following:

      - Installation procedures meet the requirements of the specifications
      - Adequacy of the training and certification of craftsmen and QC inspectors
      - Adequacy of the construction work package

  - Proper documentation to ensure traceability

  - Cable splice design fully supported by the required environmental qualification

  - Inspection documentation indicated that the approved splice design was properly installed, inspected, and tested

d. Visually inspect selected splices in power, control, and instrument cables in low and medium voltage applications to verify correctness to the developed acceptance criteria.

e. If an indeterminent or questionable quality splice is identified, open the splice and examine it visually.

3. Improper installation of flexible metal conduit due to exceeding the minimum bend radius criteria

   a. Review the following for the mechanical portion of the installation to determine the required acceptance criteria:

      - Bechtel Specification No. 5E189ES1007, "Cable Installation in Trays, Conduits, and Duct Banks"

      - Bechtel Specification No. 5E230E1008, "Installation of Electrical Cable, Raceway, and Equipment Identification"

   b. Review the resolution of any audit findings, corrective action and deficiency reports, and SAFETEAM inspections to determine whether any violations of minimum bend radius and separation criteria were identified.

   c. Visually inspect selected areas in at least three elevations in the containment and auxiliary buildings for conformance to the acceptance criteria for minimum bend radius and separation.

4. Excessive weld splatter on the incore instrumentation guide tubes

   a. Visually inspect the accessible portions of the described area for evidence of weld splatter.

   b. For any area with splatter, determine the results of the QC inspection for acceptance of the condition and any appropriate nonconformance reports.

   c. Determine if the adverse condition is in violation of the design specification requirements for the guide tubes.

VIII. COATINGS

1. Obtain the following documents for background:

   a. Site coating schedule

   b. Coating systems qualification records

c. Coating system installation specifications

d. Coating systems installation procedures

e. Coating systems repair procedures

2. Select an appropriate plant area and/or system to review.

3. Review the following for the system selected:

a. Determine if the coating system specified meets the requirements as stated in the FSAR and any other specified standard.

b. Verify that the coating system has been qualified for the application and environment.

c. Using the installation specification, coating schedule, and inspection records, verify that the correct coating system was correctly applied.

d. Review any nonconformance reports (NCRs) and field change notices or requests, for assurance that the FSAR requirements remain as met.

e. Review the repair procedures and the inspection records for repairs and note areas repaired.

4. Visually inspect the selected areas to ensure that the coating is adhering properly, appears to be of specified thickness and type, and is generally free of signs of failure or holidays.

IX. AS-BUILT INSTALLATION AND CONFIGURATION CONTROL

1. Obtain the following documents for background information:

a. Procedures for preparing design document and design change document

b. Procedures for document control

c. Procedures for preparing as-built documents, including "red lining"

2. Select an appropriate system or subsystem to verify that the as-built configuration is proper.

3. Perform the following for the system/subsystem selected:

a. Compare the approved base design drawing and specifications and approved design change documents to the as-built drawings to ensure that the approved design was maintained.

b. Review the QC and appropriate NDE inspection records for selected areas and especially for those instances in which a difference exists between the approved design and the as-built configuration.

c. Review the disposition of any nonconformance reports that deal with the lack of configuration control in the area being reviewed.

4. Perform a partial walkdown of selected areas with emphasis on the following:

    a. Conformance of the actual installation to the as-built documentation

    b. Correctness of the QC inspection records for areas where a question exists about what was inspected

APPENDIX C

SAFETY SIGNIFICANCE ASSESSMENT TEAM'S PLANT WALKDOWN OF ALLEGER OBSERVATIONS

On January 19, 1988, an alleger was invited to the STP site in order to "show" the SSAT the alleger's concerns involving fasteners on Westinghouse switchgear. The allger was unable to locate any Westinghouse switchgear, or any other safety-related switchgear. In the process of looking for Westinghouse switchgear, the alleger located and walked around the non-safety-related, 13.8-kV switchgear located in the Unit 2 turbine building.

While walking around the above 13.8-kV non-safety-related switchgear, the alleger apparently made some observations. These observations were subsequently reported as "safety and health hazards" in an attachment (OSHA-7, Notice of Alleged Safety or Health Hazards) to the alleger's January 21, 1988 letter to the U.S. Secretary of Labor. A total of 15 observations were reported.

The SSAT was at the STP site during the week of January 18, 1988 for the sole purpose of conducting inspections to assess the safety significance of alleged construction deficiencies. As stated above, the 13.8-kV switchgear observed by the alleger and the SSAT inspectors is not safety related. The lack of safety significance notwithstanding, the SSAT has commented on each of the allegers' stated observations from the perspective of nuclear safety. The SSAT's comments are included in the following observations.

OBSERVATION 1

Some protective enclosure (covers) panels on switchgear do not have any manufacture's [sic] fasteners and other enclosure panels missing several fasteners.

SSAT Comment

The alleger's observation is accurate. However, as stated above, this particular switchgear is considered non safety related. It should be noted that this particular switchgear is in a power plant that is under construction, including electrical work, and it would not be uncommon to see panels removed in order to facilitate access for making necessary electrical terminations. The switchgear terminals were not energized at this time. In addition, the SSAT has determined that the use of commercial grade fasteners in lieu of vendor-supplied fasteners will not impair switchgear integrity (see Section 5.4.3 for details).

OBSERVATION 2

One (1) enclosure panel loose on switchgear and pulled away from switchgear - about 25% engagement on to switchgear.

SSAT Comment

The SSAT comment for Observation 1 is applicable here.

OBSERVATION 3

One (1) high voltage circuit breaker front enclosure panel off the terminal/ junction box and leaning against South wall. Terminals and conductors are exposed.

SSAT Comment

The SSAT comment for Observation 1 is applicable here.

OBSERVATION 4

Bechtel Construction Procedures violated (Permanent Plant Maintenance - PPM): dust in switchgear; subjecting contacts to malfunction or flash fire.

SSAT Comment

The SSAT has no knowledge of Bechtel procedures and can not offer comment on this item. The SSAT acknowledges that there may have been dust in the switchgear, but is confident that STP procedures and programs provide for thorough cleaning of this and all other switchgear before energizing and placing them into service. Also, as noted previously, this switchgear is not safety related.

OBSERVATION 5

Several maintenance filters missing off switchgear ventilating grills.

SSAT Comment

The alleger's observation is accurate. The absence or improper installation of filters will allow construction dust to enter the switchgear. However, as stated above, STP procedures and programs require that the switchgear will be thoroughly cleaned before use. Again, this switchgear is not safety related.

OBSERVATION 6

Several maintenance filters hanging loose from switchgear grills.

SSAT Comments

The SSAT considers this observation to be a subset of Observation 5. Therefore, the SSAT comment for Observation 5 is applicable here.

OBSERVATION 7

All [sic] maintenance filters heavly [sic] laden with dust.

SSAT Comment

The alleger's observation is accurate. However, the SSAT does not understand the significance of this observation and, therefore, can not provide additional comment. Furthermore, as noted previously, this switchgear is not safety related.

OBSERVATION 8

Switchgear room floor extremely dusty.

SSAT Comment

The alleger's observation is accurate. As stated previously, this switchgear is located in a power plant under construction. Dust is an expected part of any large construction project, and cleaning of components to remove dust is a normal practice at the completion of construction and before operation.

OBSERVATION 9

No warning barriers around switchgear with missing enclosure panel fasteners.

SSAT Comment

The alleger's observation is accurate. As stated previously, the switchgear terminals were not energized. Consequently, there was no need for a barrier.

OBSERVATION 10

Breaker panel with closure off does not have a warning barrier around it.

SSAT Comment

The SSAT considers this observation to be a subset of Observation 9. The SSAT comment for Observation 9 is applicable here.

OBSERVATION 11

All doors to main switchgear room are wide open, including equipment entry/ramp door.

SSAT Comment

The alleger's observation is accurate. However, the SSAT does not understand the significance of this observation and, therefore, can not provide clarifying comments. Furthermore, as stated above, this equipment is considered to be not safety related.

OBSERVATION 12

No supervisors in attendance to secure unsafe conditions.

SSAT Comment

The SSAT did not observe any unsafe conditions.

OBSERVATION 13

No security by anyone - room totally unattended

SSAT Comment

The SSAT is not aware of any requirement for security at the specific switchgear location. STP site security for Unit 1 has been evaluated by NRC security specialists and found to be acceptable. Security for Unit 2 consists of normal industrial security and it is not required to be evaluated by the NRC.

OBSERVATION 14

No QA/QC nonconformance tags identifying [sic] above procedural and physical violations.

SSAT Comment

As stated above, the SSAT has no knowledge of Bechtel procedures, and can not comment on possible violations of these procedures. However, the SSAT did not observe any physical violations. Moreover, NRC regulations do not require non-safety-related systems and components to be covered under the QA Program described in 10 CFR Part 50, Appendix B.

OBSERVATION 15

Note: NRC Manager (inspector) present, warned us about touching loose panels and brushing against energized controls on face of switchgear.[sic]

SSAT Comment

Both NRC inspectors present when the alleger made his switchgear observations are familiar with safety procedures to be followed when working around electrical equipment. At the time of our visit to the turbine building, the NRC inspectors had not been able to verify that the 13.8-kV switchgear terminals will remain de-energized for the duration of the visit. In the absence of this verification, a prudent individual assumes the electrical equipment is energized and acts accordingly. One such action is to advise other persons of the potential danger, and instruct them in proper procedures. The NRC inspector took the action that was required under the circumstances at the time; i.e., to caution all persons not to touch the switchgear.

APPENDIX D

ABBREVIATIONS

ACI	American Concrete Institute
A/E	architect/engineer
ANI	authorized nuclear inspector
ANSI	American National Standards Institute
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWS	American Welding Society
AWWA	American Water Works Association
B&R	Brown and Root
CAR	corrective action report
CAT	construction assessment team
CCW	component cooling water
CCWS	component cooling water system
CFR	Code of Federal Regulations
CI	concerned individual
CMTR	certified material test report
C/S	civil/structural
CSP	construction site procedure
CV	control valve
CVCS	chemical and volume control system
DBA	design-basis accident
DCAR	Design Change Approval Review Board
DCN	design change notice
DFT	dry film thickness
DGB	diesel generator building
DOL	U.S. Department of Labor
DR	deficiency report
EAM	energy-absorbing material
ECCS	emergency core cooling system
ECP	essential cooling pond
ECW	essential cooling water
EDG	emergency diesel generator
EDO	Executive Director for Operations
FCR	field change request
FHB	fuel handling building
FMC	flexible metallic conduit
FMIR	filler material issue record
FO	fuel oil
FREA	field request for engineering assistance
FSAR	final safety analysis report
FW	field weld

GAP	Government Accountability Project
HELB	high-energy line break
HL&P	Houston Lighting and Power Company
IE	Office of Inspection and Enforcement
IEEE	Institute of Electrical and Electronics Engineers
IGSCC	intergranular stress corrosion cracking
INPO	Institute of Nuclear Power Operations
IOM	interoffice memorandum
IP	inspection procedure
IVC	isolation valve cubicle
LOCA	loss-of-coolant accident
LOOP	loss of offsite power
LWPS	liquid waste processing system
MBR	minimum bend radius
MCAR	management corrective action request
MCL	Master Completion List
MEAB	mechanical and electrical auxiliary building
MIC	microbiologically induced corrosion
MOV	motor-operated valve
NCR	nonconformance report
NDE	nondestructive examination
NRC	U.S. Nuclear Regulatory Commission
NRR	NRC Office of Nuclear Reactor Regulation
NSR	non-safety-related
NSSS	nuclear steam supply system
OI	NRC Office of Investigations
ORNL	Oak Ridge National Laboratory
OSHA	Occupational Safety and Health Act
PCN	potential change notice
PFI	Pipe Fabrication Institute
P&ID	piping and instrumentation diagram
P.O.	purchase order
PPM	permanent plant maintenance
PTL	Pittsburgh Testing Laboratory
QA	quality assurance
QC	quality control
QCI	quality control instruction
QCP	quality control procedure
QFP	quality field procedure
RCB	reactor containment building
RCE	rebar cutting engineer
RCP	reactor coolant pump
RCR	request to cut rebar

RCS	reactor coolant system
RIV	NRC Region IV
RPV	reactor pressure vessel
SCN	specification change notice
SEO	site engineering office
SER	safety evaluation report
SG	steam generator
SR	safety related
SSAT	Safety Significance Assessment Team
SSP	standard site procedure
STP	South Texas Project
SWN	stop work notice
TGB	turbine generator building
WPQ	welder performance qualification
WPQ	weld procedures qualification
WPS	weld procedure specification

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13. ABSTRACT *(200 words or less)*

This report provides the results of a review by the Safety Significance Assessment Team (SSAT) of the Nuclear Regulatory Commission (NRC) of alleged construction irregularities at Houston Lighting and Power Company's South Texas Project (STP), Units 1 and 2 (Docket Nos. 50-498 and 50-499), located in Matagorda County, Texas. These allegations were provided to the NRC by the Government Accountability Project (GAP) which received them from approximately 35 current and former employees of STP, and covered a wide range of concerns with hardware and quality assurance and control, and issues of management, harassment and intimidation and wrongdoing. Only those concerns considered by the SSAT to be technically-oriented were selected for review based on their possible safety significance, generic implications, specificity to a particular plant component, system or structure, and to provide a multidiscipline overview of the implementation and effectiveness of the STP Quality Assurance Program.

The SSAT review of GAP's allegations has identified no substantive safety issue that would warrant delay in the NRC's consideration of a full-power license for STP Unit 1.

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